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CLINICAL PRESENTATION OF IMPROVEMENT IN SURGICAL REPAIR OF THE FACIAL NERVE.*

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About three and a half years ago, Sir Charles Ballance and I began some animal experiments on monkeys, baboons and cats in which autoplastic nerve grafts were employed in the restoration of function in the injured facial nerve. We used both motor and sensory nerves, reversed and unreversed. We succeeded in restoring not only voluntary facial movements, but also emotional expression, thus improving the anastomosis operations that had previously been done for this type of injury.

Two years ago, I showed a few patients who had been operated by the method. I wish to present tonight a number of additional cases illustrating certain alterations in the method of using autoplastic grafts which have resulted, we believe, in a distinct improvement. Owing to the lateness of the hour, I shall be very brief in the presentation of these cases.

Sir Charles and I, discussing the probabilities, concluded that one would seldom find an injury with a dehiscence of much over five mm. in length. Sir Charles has had a large

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experience doing facial anastomoses since 1895, when he did the first anastomosis of the spinal accessory with the facial which was accurately reported. Since that time he has been doing anastomoses of the facial with various adjacent nerves in the neck. In none of these had he explored the site of injury. There had been no occasion for this since the anastomosis was done in the neck distal to the stylomastoid foramen.

The very first case operated for direct repair had a dehiscence of 27 mm., and the next one a dehiscence of 30 mm. We had decided to use Bell's anterior respiratory nerve for grafts with which to repair the facial. It was easy to get at and afforded any desired length. On account of its length, with a little dissection, it was quite possible, after excising the graft, to unite the severed ends. In every instance, in the animals, we demonstrated that the function of the serratus magnus muscle was restored. But the moment one begins to use lengths of more than 10 or 15 mm., it is quite impossible to repair that nerve by reuniting the severed ends. The consequent loss of this great respiratory muscle was a serious thing to contemplate. Therefore, we began to look for other nerves in which the loss of function of the muscle which it supplied would be of less consequence. We then began to use the intercostal nerve. In a number of cases the intercostal nerve was used with perfect success; that is, we succeeded in securing a graft which lived and which carried motor impulses to the face. I do not mean to imply that in all of these cases the results were perfect; by no means — yet, on the other hand, none have been complete failures. Grafts of whatever length employed have carried impulses to the muscles. The result has depended not so much on the length of the graft employed, or on the length of time that has elapsed before the repair, as it has on the condition of the muscle at the time of operation. Atrophied muscles can not be restored by a successful graft.

Theoretically we had decided that grafts could not be successfully used in infected wounds. The first case in which a graft was employed 27 mm. of nerve traversed an area in which an abscess had just been evacuated. The graft was bathed in pus for two months afterward. In the second case, 30 mm. of nerve traversed an area which was badly infected.

As you can see by the exhibit cases, both did very well. From these experiences we learned that we may hope for successful implants even in cases in which there is an infected

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Case 1.

Before operation. In repose 14 months later.

Case 1. (In action) 14 months later.

wound. While the conditions are not ideal, I never hesitate to proceed even in an infected field when the exigencies of the case demand it. I have now made many successful implants in infected fields.

(Third case: Seven months after injury, 20 mm. of intercostal nerve implanted.)

(Fourth case: Injury by mastoid operation; replaced by 16 mm. of a double strand of intercostal nerve. In this case the intercostal was small and a double strand was used. It is one year and eight months since the graft was made.)

(Fifth case: This patient had a tumor lying over the parotid gland. On removal of the tumor there occurred a severe arterial hemorrhage deep in the wound. After some futile efforts to compress it with a hemostatic forceps, a suture on a curved needle was passed deep into the wound and tied. The hemorrhage was controlled. Unfortunately, the facial nerve was included in the ligature. The patient had complete palsy on that side of the face. Again in a wound which was bathed in pus 17 days after the injury, we found seven mm. of black necrotic nerve distal to the ligature, which was removed and replaced by a graft from the intercostal nerve. It is now a year and six months since this was done. This is one of our best results, almost perfect to a casual observer, yet like all of them, showing imperfection on close inspection.)

In the cases I am exhibiting tonight, I am only showing you a cross section of 50 cases on which I have operated. They illustrate certain changes in the technique which experience has led us to adopt.

From the beginning of our experimental work, after the successful implantation of a fresh graft, there was invariably a long period, seeming almost interminable to both surgeon and patient, before first evidence of conveyance of nuclear impulses to the muscles was apparent. Following this first slight evidence there was a rapid improvement. Theoretically, this long delay was the result of slow emptying of the products of Wallerian degeneration in the graft, owing to the poor circulation about it. Experiments on animals demonstrated that grafts, excised from nerves in which Wallerian degeneration had been allowed to take place *in situ*, permitted the conveyance of axones from the proximal segment, through the graft to the distal segment, in from one-half to one-third the time required by fresh grafts. After many successes in animals, we adopted this method in humans. In a long series of cases it has now been demonstrated that this

method hastens the time of recovery and probably increases the quality of the repair.

From the Annals of Otology, Rhinology and Laryngology, March, 1934.

Case 2.

Before operation. After operation.

From the Annals of Otology, Rhinology and Laryngology, March, 1934.

Case 3.

Before operation. 18 months after operation.

(Sixth case: In this case we failed to get a still picture before operation. This man had a complete facial palsy. 12 mm. of dehiscence in the injured nerve was replaced by a

"prepared" nerve. It is one year since operation. In one month he began to show faradic response and then began to use his muscles.)

Since a sensory nerve is employed (anterior femoral cutaneous) there is no motor palsy. There is an impairment of sensation over a small area in the thigh. This gradually disappears from collateral innervation.

Following some unexpected publicity in the lay press, after publication in the *Milbank Memorial Journal* of some of our results, there was a large influx of patients from all parts of this country. From more than 100 cases, who came to me, 50 cases were selected for operation. Inasmuch as the preparation of the graft material required a preliminary operation, with a subsequent wait of from two to three weeks before the graft was implanted, we, on one occasion, found 12 cases in the Manhattan Eye, Ear and Throat Hospital simultaneously. It occurred to me that it might be possible to use graft material from one patient to another, thus economizing time. In talking the matter over with Dr. Eggston, the pathologist of the Hospital, he advised me very strongly to attempt heteroplastic grafts only from donor and recipient who were of the same blood type. Accordingly, all patients on admission were blood typed. Presently I found a patient, whose nerve was prepared and ready for operation, of the same type as two others who had just been admitted. All three were grafted with material taken from this patient. The heteroplastic grafts were successfully implanted in all. I show you one case in which there is a well advanced recovery (Case 7). Two others are beginning to show some response and, I hope, will eventually have a fairly complete restoration of function.

Of the 50 cases there have been a number (where a palsy has resulted from injury at time of operation) in which, on investigation, it was not found necessary to use a graft. Removal of spicules of bone or uncovering the nerve and splitting the sheath was all that seemed advisable; that is, a decompression of the injured nerve. These cases have all made excellent recovery. I show you two cases (Cases 9 and 10) exhibiting fairly good control and with synchronous emotional expression. There has been some question as to whether these expressions are emotional. I am sure if you observe these patients as they smile or cry, you will agree with me that the

impulses are involuntary, coming from below the cortical centers.

From the Annals of Otology, Rhinology and Laryngology, March, 1934.

Case 4.

Before operation. 17 months after operation.

From the Annals of Otology, Rhinology and Laryngology, March, 1934.

Case 5.

Before operation. 9 months after operation.

I have demonstrated on monkeys that these impulses are not the cortical, voluntary type. Monkeys are not given to simulating emotional feelings as humans do. They respond

spontaneously to emotions of pleasure, and fear, and surprise, with facial grimaces. Animals on which I have entirely removed the cortical facial area, so that no voluntary motions of the face are possible, have subsequently shown all of these emotional and reflex actions in the face. I have reoperated animals, in which the cortical control has been ablated, placing grafts in the facial nerve. They have recovered and have again shown the emotional and reflex actions in the face. This seems quite convincing to me that emotional impulses are conveyed through the graft. The responses we see in these

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Case 6.

10 months after operation. Before operation.

cases of direct repair are actually showing emotional and reflex movements in the facial muscles. This never happens in any restoration of facial movements through anastomosis with other nerves.

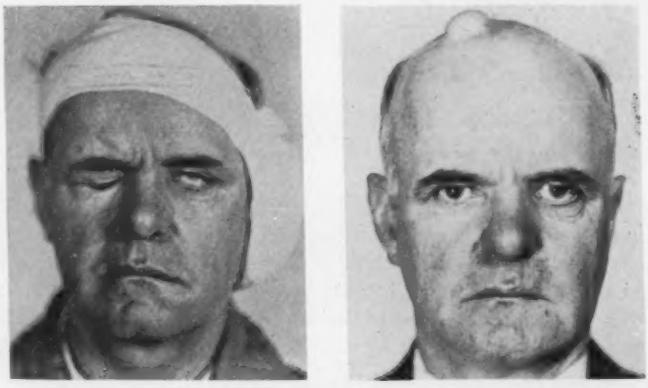
Two years ago, after showing a few cases in which a direct repair had been made by fresh grafts, I showed a case of Bell's palsy in which there had been a complete left palsy, followed by partial recovery, ten years before; and a complete right palsy, followed by partial recovery, six months before. There was an animated discussion of the case. At that time I called attention to Sir Charles Ballance's belief that such cases in which there has been only a partial recovery,

and had gone for a considerable period of time without any further improvement, ought to be uncovered and decompressed

From the Annals of Otology, Rhinology and Laryngology, March, 1934.

Case 7.

Before operation. After operation.



From the Annals of Otology, Rhinology and Laryngology, March, 1934.

Case 8.

Before operation. 9 months after operation.

by slitting the nerve sheath. This proposition met with much opposition. A feeling of doubt was expressed as to the advisability of subjecting such cases to the added trauma of slitting

the nerve sheath when partial recovery had already taken place. The thought was that by such a procedure a bad matter might be made worse.

I have conducted a series of experiments on monkeys by slitting the nerve sheath over an area of ten to 15 mm. Nine monkeys on which this was done never had a facial palsy or loss of faradic response. I have induced Bell's palsy by freezing the exposed facial nerve with ethyl chloride. One of these cases was then closed up without slitting the nerve sheath.

From the Annals of Otology, Rhinology and Laryngology, March, 1934.

Case 9.

7 months after operation. Before operation.

A number of others similarly frozen had the nerve sheath slit over the frozen area. Those in which the nerve sheath was slit recovered in one-half the time of the one in which it was allowed to remain intact. In a similar way I induced Bell's palsy by the injection of alcohol into the sheath. One monkey was closed without slitting the nerve sheath; a number of others in which a paralysis had been similarly induced had the nerve sheath slit, as in the refrigeration cases. Those in which the nerve sheath was slit recovered twice as rapidly as those in which it was left intact.

This girl whose picture I show you had a decompression of the facial nerve from the level of the horizontal semicircular canal to the parotid gland, at a time when there was a

complete palsy on one side, and a partially recovered palsy on the other. She now has an even, synchronous, voluntary

From the Annals of Otology, Rhinology and Laryngology, March, 1934.

Case 10.

Before operation. 3 months after operation (in action).

Case 10. 3 months after operation (in repose).

and emotional control of her face. It is not by any means perfect, but it has been sufficiently good to extricate her from practical social ostracism and to permit her to be self-supporting again.

I have done a decompression on several other cases of Bell's palsy in which the partial recovery has remained without further improvement over a long period of years. The time of observation has not been long enough and the successes are

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Case 11.

Before operation (in repose). 5 months after operation.

Case 11. Before operation (in action).

not yet sufficiently good to make me speak very authoritatively on the matter, but I am convinced that Sir Charles' belief that these cases should be uncovered early, after it seems almost certain that further improvement is not probable, will finally be the adopted procedure.

DISCUSSION.

(Question about the other two cases which had heteroplastic grafts.)

Of those other two cases, the patient who furnished the graft had gone for seven years following the injury. She is just beginning to get a flicker of response. The other patient is beginning to improve. The third recipient has recovered very rapidly.)

(Dr. Kopetzky: I have been requested to ask you a question. How long after an injury is the reconstruction plastic work possible? What is your opinion?)

I have operated several cases in an experimental way in this series of 50 cases. Some I did with very little hope of success. One man had gone 20 years and had a marked atrophy of the facial muscles, but I did get a slight response with the strong galvanic current. This man now can close his eye and sleeps with his eye closed, which is more than sufficient compensation to him for the operation. There have been three or four other cases which, although the grafts lived, I consider complete failures; operated after many years. I would say it does not depend so much on the length of time as on the condition of the muscle. Any case, no matter what the elapsed time, which has a good galvanic response, will get motion back in the face after a successful graft and, perhaps, in repose it will be difficult to recognize he has a facial palsy. If there is no response in the muscles to the galvanic current I think it is "love's labor lost" to restore the line by a nerve implant.

135 East 64th Street.

ACUTE FRONTAL SINUSITIS AND BRAIN ABSCESS.*

DR. WALTER CARISS, Philadelphia.

When, where, how to operate—that's the question.

Faunce and Shambaugh[1] say the successful treatment of brain abscesses depends largely on timely diagnosis, as well as on proper surgical procedure. Dandy[2] says surgery has no part in the treatment of acute abscesses within the brain.

As to methods, Mosher and Cahill[3] say "drain." Grant said "drain" but is now uncertain as to the wisdom of this procedure. Eagleton[4] and many others favor wide exposure of the operated area. Some other neurosurgeons say "no."

Another question arises—since a great majority of brain abscesses are of sinus or otitic origin, is it the field of the neurosurgeon or of the otolaryngologist?

Vomiting, slow pulse, peak temperature at some time during the 24-hour period, papilloedema, spinal fluid pathology, are all frequently described as more or less constantly symptomatic of brain abscess.

So great a diversity of opinion, such contradiction of statistics as to methods and results, such variation of symptoms, leaves us confused.

Therefore, each such case is of particular interest and reportable; for these reasons and for idiopathic symptomatology which practically each case of brain abscess presents, the present case is reported.

Dr. J. W. J., age 30 years; previous medical history practically negative; apparently well until Jan. 3, 1934, when he complained of pain in the left supraorbital region; during the day this pain became more severe and patient felt, as he described it, "grippy" although he worked all that day. The following day the headache was more generally distributed and much more severe, particularly in the left supraorbital

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region. The following day, Jan. 5, patient felt worse; headache continued (temperature had risen to 104°); patient had developed some nasal discharge and a general feeling of illness and had remained in bed.

Late in the afternoon of this day he was seen at his home, at which time the following condition was noted: Chief complaint was severe left supraorbital headache with tenderness in the region of the supraorbital notch; the uppper and lower eyelids on the left side were inflamed and edematous (so that patient had difficulty in opening them); there was no exophthalmos; no increased tension; pupillary reflex was normal; ocular movements were normal; the nasal mucous membrane in both nostrils was congested and both nostrils showed purulent discharge, especially marked in the left middle turbinate region. Transillumination showed a slightly heavier shadow over the left frontal and left maxillary sinuses than over the right side, but very slightly so and not definitely dark; pharynx was normal; ears normal; patient was perfectly rational and co-operative (temperature was 104.3°; pulse 94; respirations 20). At this time the condition appeared as an acute sinusitis.

Ice compresses were ordered over the inflamed eye and left frontal sinus; astringent drops were prescribed for the nostrils and a mild sedative was given and patient told that if he was not improved by morning, he should go to the hospital, as he seemed quite ill.

During the evening he seemed improved and said he felt quite well. About midnight he had a convulsion lasting several minutes; a neighboring physician was called, who did not see the patient during the convulsion, but reported to me over the phone that immediately following the convulsion, patient was very uncooperative and apparently confused; he was immediately admitted to the Presbyterian Hospital by ambulance, at which time he was quiet and apparently rational and cooperative.

At this time, the temperature was 103°, pulse 124, respirations 28, blood pressure 110/70.

When seen later in the day, patient had apparently improved. His temperature, pulse and respirations were still elevated, but his headache was not nearly so severe and he

said he felt very much more comfortable and had no complaints. Inflammation and swelling of the lower lid had practically subsided and the patient was able to open his eye, although the upper lid was still inflamed. Examination later in the day by Dr. George Griffith showed knee jerks diminished; all deep reflexes greatly decreased; slight prolongation of the respiratory sounds over the right upper lobe; otherwise examination was negative, and Dr. Griffith expressed belief the fever was essentially due to sinusitis, although the lung was suspicious. X-ray of the chest reported unusual degree of feathering in upper lobe with bronchial thickening; lower lung field relatively clear. *Conclusions:* This evidence is not sufficient for a present diagnosis of bronchopneumonia, but is certainly suggestive of very early infiltration, as yet limited to finer bronchial divisions.

X-ray of the sinuses taken this same day showed a diffuse hazy density involving the left frontal, orbit, ethmoid area and left maxillary, except for a small central clear space. This gives the impression of an acute and recent type of infection, widespread, and although there is no definite evidence of the same degree of haziness on the right side, the right sinuses are questionable, especially frontal and maxillary. *Conclusions:* Acute pansinusitis, the present involvement including all of the left side, possibly sphenoids and some right cells.

The urine showed albumin; many hyalin and granular casts. The blood count showed 97 H.B.; R.B.C., 4,570,000; W.B.C., 10,950; polys., 88 per cent; small lymphocytes, 11 per cent; large lymphocytes, 1 per cent. The sputum was negative for pneumococci.

Local treatment for the sinus condition was continued as outlined when the patient was first seen.

The following day, Jan. 7, patient seemed much improved; the headache had disappeared; the nasal discharge was profuse; temperature was 102.2°, pulse 100, respirations 24, and he reported that he felt very comfortable and was in very cheerful spirits.

The lung condition apparently also had improved. The inflammation and swelling of the upper eyelid was markedly lessening and patient could open his eye very freely.

The following day there was hemoptysis and definite consolidation of practically the entire right lung, although the temperature had dropped still lower than it was the previous day, 100.2°, pulse 88, respirations 22, and the patient still said he had no complaints and felt he was improving. There was no headache and eye examination at this time by Dr. Langdon showed "lid motion" normal; ocular rotations full and normal; pupils equal and normal; no exophthalmos; media clear; fundi healthy.

The urinary findings had much improved; sputum culture taken this day showed no pneumococci; the leukocytes, 12,790, with differentials practically the same as on admission.

The following day, the ninth, there was apparently a beginning consolidation of the upper left lobe, *i.e.*, dullness and prolongation of expiration, although patient still seemed in good condition and seemed to be improving in spite of the lung condition.

Jan. 11, six days after his admission, the patient was described by nurses as being cranky and disinclined to talk, although he would answer "yes" and "no"; was rational and co-operative but "irritable." At this time the leukocytes had increased to 18,900, but otherwise condition was apparently unchanged and he said he had absolutely no pain and was comfortable. On this date, sputum examination showed pneumococci Type IV.

The following day, Jan. 12, the patient was decidedly worse, in that he was more stuporous, had loss of speech and impairment of cerebration when seen in the morning. Later in the day, there was right facial weakness; weakness of the right arm; diminution of reflexes in right arm and forearm; loss of abdominal and cremasteric reflexes and suggestion of bilateral ankle clonus. Temperature was 101.4°, pulse 80, respirations 20, blood pressure 130/80, lungs clear except in lowest portion of right lower lobe.

Examination later in the same day by Dr. Cadwalader is as follows:

Patient lies with eyes closed. Does not answer questions nor commands but gives me the impression of understanding most of what I've said. It is impossible to test for word

deafness, but my impression is that he had not any marked degree of word deafness. With the spoon test there is no cooperation so that hemiopia (presence or absence) cannot be tested. The eyes are held closed and he will not open them, showing, therefore, that there is no paralysis of the upper facial distribution, but in pricking his face with a pin he seems annoyed and does draw up the left side of his face, but on the right side it is not drawn up so well. This is probably due to a critical type of weakness on the right side, but it is not well developed. The ocular movements appear to be normal in all directions. Because of lack of cooperation it is difficult to test muscular power of limbs, but the right upper limb seems to be somewhat weaker than the left upper limb, yet there is by no means a marked paralysis. The biceps reflex on right is fairly active, but not exaggerated, perhaps a little more prompt than that on the left. About the same difference exists in the lower limbs. The right lies on the bed partially rotated outward, but can be drawn up when pricked with a pin and gives the impression of being somewhat weaker than the left. Plantar reflex, left, is normal in flexion. On the right, there is not a distinct Babinski, toes go into flexion, but is less active than the left. I cannot find clonus on either side. Abdominal reflexes are present, equal, but not active. My feeling is that the condition is probably one of generalized cerebritis, due to infection, but I cannot be sure than an abscess is not present. If latter is present, focalizing signs at this time are hardly sufficient to warrant a certain diagnosis of its situation. Have advised a lumbar puncture for diagnostic purposes, appreciating that there is some danger and only a small amount of fluid to be withdrawn. If the pressure is not over 10-12 mgm. of Hg. then to give fluids and to treat as a case of infection. Withholding fluids under such circumstances is hardly necessary unless intracranial pressure is proved to be very high.

Jan. 13: Patient is conscious, understands everything said to him. Replies to all questions by nodding his head yes and no. Rotates head or rotates arm properly on command. Closes and opens both eyes equally and well. Ocular rotations seem to be normal. On opening the mouth, which he does on command, the nasolabial fold on the right side is less distinct than on the left. Can draw up corner of mouth on each side in showing teeth, fairly well on right side, but not quite so

well as on the left. Difference is very slight and not sufficient to say that there is a positive facial paralysis. Movements of right upper limbs show power against resistance is well performed and it is doubtful whether they are any weaker than the left side. Same is true of lower limbs. I would hesitate to say that there is any evidence of right-sided paralysis. Biceps reflex on right somewhat greater than left, but the patellar reflexes are equal and within normal limits. Plantar reflexes are normal. All in all, he is much better than last evening. Co-operates fairly well, but will not speak. I do not believe this is due to aphasia. I still think it more doubtful today than last evening that a brain abscess is present and, in consulting with Dr. Cariss, we are both satisfied that the felt frontal sinus is infected and should be explored, and the general treatment should be that for infection, giving fluids, etc. The report of the nurse as to convulsions should not be taken too seriously without careful analysis.

X-ray of the sinuses taken again showed left-sided involvement as at previous report and more definite shadow of left frontal, though pictures were less clear generally than first ones.

It was thought advisable to inspect the posterior frontal sinus plate for possibility of area of direct intracranial extension.

Under avertin and novocaine anesthesia, intranasal left middle turbinectomy and light curettage of the left ethmoids and external left frontal operation was done.

The first opening into the frontal was followed by escape of thick creamy pus under pressure. The entire anterior left frontal plate was removed. The posterior plate was smooth and in good condition, except a very small superficial area of roughening in the upper outer portion in the angle between the junction of the two plates. This was smoother. No point of perforation was discovered. The intersinus septum was removed and the right frontal was involved similarly to the left. This was inspected and no area of extension found. Both sinuses were drained through the left nasofrontal duct into the left nostril and incision closed.

During following 18 hours, condition seemed generally improved but then, because of beginning of recurrence of symp-

toms, Dr. Francis Grant felt that investigation of left frontal region was desirable.

The following day, Jan. 15, Dr. Grant made trephine opening through a clean field above the left frontal sinus. The Hudson drill nicked the dura and 3 or 4 cm. of creamy pus escaped. The bony opening was enlarged to be sure pus was not extradural. The dural opening was then enlarged to allow brain to herniate in attempt to seal subarachnoid space. A small rubber drain was placed in the infected area, wound packed with alcohol gauze and closed, pending further exploration later.

Following this, patient had numerous right-sided facial convulsions, rising temperature, rising pulse rate, falling blood pressure and increased leukocytosis. Spinal fluid was negative. Eye examination this day negative.

The following day, the dura was exposed through the posterior plate of the left frontal sinus and was found thickened and with granulations on its outer surface. On opening dura, three or four discrete pus pockets were found, each containing 3 or 4 cc. of pus. There was no large abscess cavity. The original opening was exposed and a little more pus obtained. A small drain was passed from the upper to the lower wound and both packed with iodoform gauze.

Patient's condition became increasingly grave, although convulsions were much less frequent and severe following second operation. He was unable to take nourishment, was supported by blood transfusions, intravenous glucose and hypodermoclysis.

Jan. 18, two days after last operation, he had stiff neck, bilateral Kernig, bilateral clonus and indications of diffusing cerebritis. The spinal fluid, which previously had been normal in all respects, showed a pressure of 24 mm. of Hg., but was clear. Showed five cells and no organisms. Blood culture taken today, Jan. 18, was reported, Jan. 20, as positive for staphylococcus — one taken the day of admission had been negative. Patient's condition had changed little, if any, during previous 48 hours.

Following positive blood stream finding, Dr. Griffith advised typhoid vaccine intravenously. Thirty-five million killed

typhoid organisms were given intravenously at 8:30 P.M. Almost immediately the pulse rate increased, respirations became labored, pulmonary edema marked, the temperature rose to 106.6° and patient died at 3:10 A.M.

The interesting points in this case are:

1. The completely negative history indicating a very rapid virulent infection showing intracranial involvement from the beginning as evidenced by the severe headache, swelling and inflammation of the eyelids and convulsions within 60 hours of the first symptom.

2. The subsidence of symptoms and apparent improvement and resistance of patient during the first five days following hospitalization, with the associated conditions of nephritis and pneumonia, complicating diagnosis.

3. The normal eye findings, the unusually even temperature line, slight variations in pulse and respiratory rate, normal spinal fluid findings, except increased pressure four days before death.

4. The personality change and motor aphasia before development of other definite symptoms, both suggestive of frontal lobe abscess.

5. The apparent improvement during interim of the neurological examinations the twelfth and the thirteenth, in spite of intracerebral conditions present.

The acute development and the multiple, discrete abscesses, apparently unencapsulated, made a practically hopeless prognosis.

Culture from sinus, from abscesses and final blood culture showed staphaureus.

Simple encapsulated localized brain abscess is undoubtedly being more frequently diagnosed preoperatively and more successfully treated, but when a diffusing cerebritis or increased pressure intervenes, both diagnosis with localization and treatment become complicated.

Cahill[5] says, "The treatment of nonencapsulated abscess with its walls of infected and necrotic brain tissue has not been satisfactory."

Grant[6] says, "A brain abscess should not be drained until it seems certain that encapsulation has occurred."

Dandy[7] says, "Encapsulation is an absolute prerequisite to any form of successful treatment."

About this phase, there is unanimity and certainty but, that for uniformly successful results we are dependent on Nature's aid, as well as skill in diagnosis and in surgery, admits of no contravention.

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REPORT OF A CASE OF MULTIPLE DENTIGEROUS CYSTS INVOLVING BOTH MAXILLARY SINUSES.*

DR. GEORGE W. MACKENZIE, Philadelphia.

A dentigerous cyst is a cystic formation in the bone surrounding the root of a tooth in contradistinction to a pathological resorption of bone from an infection. A dentigerous cyst may go on for years without becoming infected during the interim it gives rise to no symptoms. If, on the other hand, the tooth with which the cyst is connected becomes carious as far as the pulp chamber, the infection spreads by way of the root canal to the cyst, when there develops symptoms that give the patient and the dentist considerable annoyance. The resulting abscess becomes a surgical problem that requires skill on the part of the rhinologist.

A dentigerous cyst is lined with pavement epithelium. These cysts vary in size from a small pea to a walnut or even larger, and the contents remain sterile until secondary infection takes place. They contain cholesterin crystals. Sometimes these cysts rupture spontaneously, due to a process of resorption, thinning out of the bone, when secondary infection may occur, but more often they become infected after the manner noted above.

The development of a dentigerous cyst is slow and quite painless.

As to the etiology: There are two theories, that of Magitot[1] and that of Mallasez.[2] Magitot claims that they originate from a periostitis at the root of a tooth. He stresses the importance of the periostitis beginning at the very tip of the root. The periostitis is of the productive type, resulting in the formation of a cyst which remains in communication with the periapical foramen. This theory does not explain all the phenomena in connection with dentigerous cysts and has given way to the theory of Mallasez.

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Mallasez claims that the cyst originates from epithelial rests of the enamel germ, which under the influence of pathological irritation and hyperemia multiply and form a cyst. The cyst wall consists of connective tissue, on the inner surface are squamous epithelia derived from the remnants of the enamel germ. This theory of Mallasez has received further support from the careful investigations of G. Scheffs.[3]

Dentigerous cysts although in the majority of cases would seem to occur singly, at least from the clinical standpoint; but, examination of anatomical specimens show that they are quite as often found to be multiple. The reason for this discrepancy is due to the fact that but a single cyst bothers the patient at one time.

The case I am reporting tonight is one in which there were three cysts found in one maxillary bone and three in the other. In spite of the fact that all six cysts were fairly large (none smaller than a fair sized bean) they were overlooked and only discovered by repeated X-ray examinations of the teeth and sinuses.

It was necessary to do radical maxillary sinus operations on both sides. On one side a Caldwell-Luc was done and on the other a Denker operation. This latter operation was necessary because the most anterior cyst reached the foremost limits of the maxillary sinus. None of the six cysts were operated from the alveolar process inferiorly, but were all approached from the inside of the sinus. One factor at least made this latter route the one of choice and that was the presence of complicating maxillary sinus suppuration. More than one operation was necessary, due partly to the fact that one or more of the cysts were not immediately detected either by the Roentgenologist or the rhinologist (the writer).

It is worth reporting that the operations on the cysts as well as the sinuses were successful. There was one complication to arise and that was a fistula on the left side between the sinus and the mouth, that required a secondary operation to close. It is difficult to tell much about a case so full of interesting features as this one within the space of ten minutes. A few X-ray films are herewith submitted, which help to tell the story.

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269 S. 19th Street.

THE AMERICAN BRONCHOSCOPIC SOCIETY.

The following officers of the American Bronchoscopic Society were elected at the annual meeting of the Society, held in Cleveland, June 11, 1934:

President: Dr. Henry Hall Forbes, 40 E. 61st St., New York.

Secretary: Dr. Lyman Richards, 319 Longwood Ave., Boston, Mass.

DIETS: A DISCUSSION OF CERTAIN METABOLIC PRINCIPLES AND THEIR APPLICATION TO OTOLARYNGOLOGY.*

DR. CECIL STRIKER, Cincinnati.

In the pleasant task of addressing you, on the subject of food, may I express the hope that this repast be stimulating and nutritious, and not sufficiently heavy to induce indigestion or somnolence.

In the first part of the paper I shall try to give you scientific data, to show how our modern dietary regime has evolved, and many disconnected but interesting bits of knowledge concerning our past food habits, and in the latter part I shall discuss some metabolic problems and their relation to otolaryngology.

Inasmuch as one of the prime instincts of man is self-preservation, the evolution and development of man has revolved about the question of obtaining food. When we read about the early migratory races, we marvel at their wanderlust and, in view of this, consider them a shiftless ambitionless group. However, on more critical inspection we find that migration was only a means to an end, namely the obtaining of food.

There are two rather common quotations from which we derive a great deal of amusement: "Does man eat to live or live to eat?" and "Tell me what thou eatest and I will tell thee what thou art."

Insofar as the diet is concerned, the mammalia may be divided into three classes: the carnivora, the herbivora and the omnivora. As the name implies, the carnivora are the flesh eaters, the herbivora are animals which maintain life on leaves, grass, etc., that is, horses, cows and their kind, whereas the omnivora are animals which eat both meat and vegetables, as man, squirrels, apes and rats.

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Before going into the types of food consumed at the various periods of evolution, it might be worth while to review the evolutionary scale upon which man has ascended.

While man was beginning his struggle upward from the ape, a vast continent stretched from India to Africa; the Pacific islands, collectively known as Polynesia, represent the remains of what was then a vast continent; the region of the Sahara Desert was some 2,000 feet higher than it is now, and was watered by many great rivers, and Asia was united to America in the region of the Behring Strait.

Man's dietetic career can be divided into fairly definite periods; the precooking period, dating from the anthropoid period to the early hunting period; the precibicultural (relating to food culture) cooking period, from the discovery of cooking to the introduction of agriculture and animals, for food; the cibicultural, from the time of interest in cultivation until the present time.

In early times, seeds constituted the most important source of the vegetable food of man. Containing as they do, an embryo plant besides starch and fat, they contained a small amount of protein. Some, like the grass seeds, require to be collected in large quantities, while others, like acorns, chestnuts, palms and leguminous plants, yield a good store. Wild fruits did not contain much nourishment but were rich in watery solutions of sugars and salts. The "fleshy roots," tubers or rhizomes, contained much nourishment for they had much starch. Contrasting the uncultivated vegetable foods with the corresponding vegetable foods, we find the former differ from the latter chiefly in containing a larger proportion and a denser kind of cellulose and in being less palatable because of the bitter and acrid principles. As for the animal food of evolving man, it may safely be said that animal food in any or every form was acceptable to him. Some kinds would naturally be preferred to others but there can be no doubt that at any rate in times of dearth all kinds were greedily eaten, from fish, birds and bird eggs, and every species of mammal down to worms, snails, insects, caterpillars, lizards, snakes and shellfish.

In the anthropoid period, there is every reason to believe that our precursors resembled present day anthropoids and

probably subsisted on much the same kind of diet as do the latter. The homosimian period shows the simian prehuman subsisting on mainly raw vegetables but making some attempts at eating animal food; however, only getting the smaller animals because of lack of efficient weapons.

The precooking hunting and fishing period began when the evolving organisms developed hunting weapons, and they withdrew from a vegetarian regime and became "animalized."

The precibicultural coctural period brought in cookery and probably man applied cookery to vegetables rather than to animals at this period. With the discovery of cookery the next great dietetic advance was made. This was the artificial production of food by the cultivation of plants and the breeding of animals. It is conceivable that breeding of animals might have come into vogue but agriculture would have been retarded, since most of the important articles, such as cereals and roots, need cookery.

The cibicultural age began about 80,000 to 100,000 years ago. One of the first advances in the direction of food culture was the storage of supplies to provide against scanty seasons; a second was the preservation and protection of plants valuable as food. Man also learned to store animal food by drying and smoking.

Flint implements, artificially fractured for fire, have been found in the Miocene strata of Thenay, of 1,000,000 years ago. The fact that fire has been so long utilized is sufficient proof of the antiquity of cookery, for there can be little doubt that to cook food was one of the earliest uses to which fire was put. But it was not until the simian period that cookery was used consistently in the preparation of foods. The simplest method of cooking was by direct exposure of food to the fire, either by placing it actually upon the fire or by cooking it in hot embers. Another method was to wrap the article to be cooked in leaves. In the early life, the cooking of animal food simply consisted in throwing the carcass into the fire and while one portion charred, the other remained raw.

The first great advance in cookery occurred when underground ovens were employed. We feel that our present day "fireless cooker" is a very ingenious apparatus; however, as far back as the paleolithic era (300 to 500,000 years) "stone

baking" was employed. This consisted of digging a hole in the ground, placing stones therein and building a fire above them. The stones were heated and removed with wooden tongs. Then the article to be cooked and the stones were placed on alternate levels in the hole. This took a while and usually the food was put in at night, to be consumed the following morning. The next great discovery occurred when man discovered how to boil water. This came after stone baking and some of the present Australian natives are still unable to boil water.

The drink of primitive man consisted of water obtained from pools, lakes or streams. They did not appear to dig wells, because of their nomadic nature. Precibicultural man drank by leaning down to the water's edge, after the manner of cattle, or he may have used his hands as a cup. He also had some insight into the therapeutic value of water. The Australians imbibed large quantities of it for dyspepsia. Blood and liquid fat may also be reckoned among the drinks of the precibiculturists; the bushmen drank the liquid fat of the hippopotamus. They were ignorant of the making of alcohol. Alcohol was not discovered until man reached the agricultural stage, which is the latest in the evolutionary scale.

It may be interesting to relate the quantity of food that some of the primitive people consumed. It is stated that five bushmen devoured a whole zebra in a few hours, a Feugian ate 24 pounds of meat at one sitting.

A few scattered bits of interesting information concerning the diets and foods of different peoples will now be outlined. This is not given in chronological order as all sources of information are so scattered.

Although pork was forbidden to the Jews by the Mosaic law, the Greeks ate pig in the heroic ages and, before the advance of luxury had given birth to the professional butchers, the warriors of Homer killed, dressed and devoured their own pork. At one period the Roman butchers sold meat by mication, in the following way: the buyer shut one of his hands; the seller did the same; each of them suddenly opened the whole or a few of his fingers. If they were even on each side the seller had the price he asked, if they were odd the buyer gave the price he offered. The Romans were especially

a pig-eating race, and retained their fondness for pork from the foundation to the fall of their empire. Neither the Phoenicians, Indians nor Mohammedans would eat pork.

For a long time it was thought by ancients a sin to eat the flesh of the ox. Moses placed the ox in the first rank of animals whose flesh is allowed to be eaten. Hippocrates praised ox flesh as nutritious but thought it indigestible. Among the early Romans the ox was so precious that a citizen was banished for killing one, even if it were his own property. In the old times the Egyptians hatched chickens in ovens. As for ducks, Plutarch always gave them to his family when any of them were ill, and Mithridates was accustomed to mix the flesh of ducks with all he ate as an antidote against poisons, which he feared. The more wealthy Romans only offered their guests the breast and head, returning the remainder to the kitchen.

The goose had its praise sung by Homer and it was a favorite dish of the Egyptian monarchs. A sentiment of gratitude endeared them to the Romans as by their noisy clamor they had formerly saved the capitol and they were reared both in town and country to guard the house. The most luxurious eaters of the Roman empire valued only the livers of geese and by a fattening process increased the size until the liver often weighed two pounds. This feat was paralleled by a queen of France, who spent 60 pounds sterling in fattening three geese, whose livers she wished to render more than unusually delicate. The taste for this delicacy was illustrated by an epicure, who prayed that he might have a throat as long as the stork's, in order the better to enjoy such a delicious food.

With the Romans, the love of fish became a mania. There was a barbarous refinement that the Romans not infrequently did at the banquet table. The fish alive but with its scales removed was placed on the table in a glass vessel, beneath which was a flame; the object was to allow the guests to regale themselves with observing the gradations of pink colors, through which the fish passed until it was at once dead and cooked.

Hippocrates held boiled cabbage and salt to be a specific cure for colic. Cato affirms that this plant infallibly cures

all diseases. It was due to its use, he adds, that the Romans were able during 600 years to do without the assistance of physicians, whom they had expelled from their territories. Some looked upon horseradish as a panacea. Young Athenian mothers ate it when nursing their infants for the supposed benefit of the progeny. A mixture of onions and honey when swallowed on a fasting stomach was considered the best preserver of health. The onions were giant size but could not compare with what is asserted of Judean radishes, namely that foxes could litter in the hollow of them and that they weighed a hundred pounds. They were used as projectiles by the mob. After they knocked down their victims and the fight was over, they would boil their weapons (radishes) and eat them with vinegar.

Eggs were fashionable in Rome, Livia kept one in her bosom till it hatched; when a cock chick appeared she divined that she was about to present her husband with a male heir. The birth of Tiberius proved her worth as a diviner. The Egyptian method of cooking eggs without fire was very interesting. The shepherds of Egypt placed them in a sling, which they turned so rapidly that the friction of the air heated them to the exact point required for use.

Bread and milk gives us now but a simple idea of a simple yet wholesome dict. It was used, however, for other purposes than food in the Roman days. Roman "exquisites" of either sex rubbed their faces with a mixture of bread and milk in order to make their complexion fair. Milk baths, too, were more common with the Romans than with the French in the days of Louis XV. Five hundred asses supplied the milk for the daily bath of the Empress Poppoeia. Milk was prescribed for enervated kings and forthwith all the nobility took to imbibing asses' milk as a symbol of their loyalty. For five centuries after the foundation of Rome the art of bread making, as we know it, was unknown.

Maimonides said that the best meat of four-legged creatures is that of a fat sucking kid, next comes that of fat sucking veal; lamb is juicy. As for meat of the other four-legged animals, I should advise anyone who wished to produce in himself the best of chyme to steer clear of them. Testicles contain filth, but the testicles of fattened roosters are very sweet and good eating. Any sort of brain (sweet-

bread) harms the stomach. Wine with equal quantity of water warms the whole body and makes the limbs move with more suppleness. The worst of all waters is that which is the residue of ice or snow. Milk is more nourishing than wheat. Almost all fruits of trees with few exceptions if eaten with their leaves (fresh) when they are well digested do not give rise to bad chyme. Olives strengthen the stomach, stir up the appetite. The most weakening foods are green vegetables and most of the fruits which are surrounded by a thick shell. They are difficult to digest and they weaken the body. Whoever likes them, shortens his life.

Coming now to relatively more recent times, a short sketch of the food habits of some of the Eskimo races will be given. Eskimos do not have a dainty palate. Choice dishes are a bowl of coagulated blood, mashed cranberries with rancid train oil (whale fat), whortle berries and walrus blubber, venison steeped in seal oil, raw deer's liver cut in small pieces and mixed with the warm half-digested contents of the animal's stomach; bowls of live maggots, a draught of warm blood from a newly killed animal. Meats are kept in sealskin bags for over a year, decomposing but never becoming too rancid for our Eskimos. It is a singular fact that in the coldest climate inhabited by man, fire is less used than anywhere else in the world, equatorial region perhaps excepted. Heat is supplied by raw food and fur clothing.

Having dealt with food evolution and food habits, I will now give a very brief survey of feeding hours and implements. The idea of breakfast in historic times did not usually correspond in the least with what we now understand by the word. The original sense of the word was to unfast or breakfast for the main meal which was eaten at 10 o'clock or decimen-diner-dinner. It may be worth while mentioning here that the now familiar sandwich gets its name from the fourth Earl of Sandwich (died 1792), who, being a confirmed gambler, invented it in order to remain at the gambling table without interruption.

The fork formerly was two-pronged. Men used to bring their own knives to the dining table. The dinner fork was not commonly introduced in England until 1608, when Thomas Coryat observed it in Italy. At first he was much laughed at, the novelty being described by one person as "an insult to Providence, Who had given us fingers."

The salt-cellar in early days was one of the most important things on the table, because the station of the guest was indicated by offering him a set "above" or "below the salt." A significant fact connected with the use of food by our ancestors is that our modern titles of Lord and Lady are founded upon the Saxon name for loaf. The word Lord originally stood for "loaf ward" and had the meaning of loaf keeper, while Lady meant "loaf kneader."

Finally, one can get an idea of the cost of some of the royal banquets of comparatively recent times. In France, in 1824, at the coronation of Charles X the banquet cost $1,000,000. In 1746, the Earl of Warwick gave a banquet which would be memorable for many things, but I shall only describe the famous punch concoction. The bowl was the marble basin in a delightful garden, forming the central point of four vast avenues, bordered with orange and lemon trees. A magnificent collation was served on four immense tables which occupied the whole of the several avenues. The basin has been filled with four large barrels of brandy, eight barrels of filtered water, 25,000 citrons, 80 pints of lemon juice, 13 hundredweight of sugar, five pounds of nutmeg, 300 biscuits and a pipe of malaga wine. An awning over the basin protected it from the rain. In the beverage was a charming little rosewood boat; a cabin boy, belonging to the fleet, rowed about the surface of the punch, ready to serve the joyous crowd, which numbered more than 6,000 persons.

I shall now take you to the modern and practical consideration of food.

From what has been told you one can see that man's diet has gone through an evolutionary development, hand in hand with his own evolution. In this scientific world, however, we have not been satisfied with the "hit or miss" slow development but have analyzed man's food requirements. In many instances we have been able to improve on the "natural evolutionary methods."

Our food now is preserved, purified, polished, pickled, canned, extracted, distilled, concentrated, heated, dried, frozen, thawed and stored. How are we to select the food that is good for us?

Through painstaking observations and experimentation we have found that man's diet can be analyzed into the following components: Carbohydrates or sugars, for food energy; fats for heat; proteins for body building; and water, mineral salts and vitamins with their multitude of functions.

Just as in the specialty of otolaryngology there is specialism, so also in the field of diet therapy there is specialism. Today we have the gastroenterologist, the allergist, the infant feeder, the vitamin expert, etc. Both time and ability prevents me from discussing all phases, therefore I wish to confine my remarks to certain metabolic principles and their relation to otolaryngology.

We are all aware of the wide range between man's need for food and his actual intake. Body requirement on caloric intake is based on age, occupation, sex and square meters of body surface. It has been found that under basal conditions the body requires 25-30 calories per kg. of body weight and this may rise to 80 cal. per kg. of body weight, depending on the type of work. In addition to the caloric intake one must have a knowledge of the type of food that supplies the calories. There is an irreducible minimum of protein required. This is due to the fact that, unlike fat and carbohydrate, protein is not stored—a minimum of one gram of protein per kg. of body weight is advisable.

There must be a definite relation between the amount of carbohydrate and fat combusted. Incomplete combustion of fats produce ketone bodies which may lead to an organic acid acidosis. In addition to the above there are basal requirements for certain minerals, as Fe., I., Mg., Ca., P., Na., Cl., etc.

From the above one can see that many known and unknown chemical reactions take place. A proper chemical balance makes for good health, whereas disease arises when there is an alteration. I shall not attempt to go into all of these complex chemical changes, but will discuss acidosis, alkalosis and some phases of mineral metabolism.

Very considerable amounts of acids are constantly being produced in the body during the process of normal metabolism. These acids, like all others, owe their activity to the hydrogen-ions liberated in solution, these hydrogen-ions are capable of bringing about marked physiologic changes or even

death. Fortunately the body possesses a very effective mechanism for rendering the hydrogen-ions ineffective. The degree of acidity or alkalinity within the various cells of the body differ slightly from that of the blood, but the blood reflects the reaction throughout the body. Van Slyke has defined acidosis as a condition in which the base in the blood available for combination with bicarbonate is diminished, and the opposite condition alkalosis, as one in which there is present an abnormal excess of base available for combination with bicarbonate.

The body possesses three important agents for regulation of neutrality;—bicarbonate, phosphate and ammonia.

In the normal individual, breathing normally, carbon dioxide is excreted at the same rate as it is being formed, so that there is a fairly constant balance maintained in the blood between carbonic acid and the proportion of that carbonic acid neutralized to bicarbonate by available base. As long as there is an automatic response by the respiratory mechanism to any increased production of Co2 by the tissues or to any change of concentration of base in the plasma, so that the ratio is maintained at a constant value, the PH of the blood remains unaltered.

Unless there were means of replenishing the depleted blood bicarbonate or means other than respiration for removal of foreign acids from the body, fatal acidosis would frequently occur. Fortunately there is a mechanism for the replenishment of the bicarbonate. The kidneys are able to secrete urine which is much more acid than the blood. This is accomplished by the excretion, chiefly of acid phosphate, which is formed from a more alkaline phosphate occurring in the plasma.

In the presence of acidosis the urine is usually more acid than normal. The urine is normally somewhat acid, having an average PH of about 6.0, although the reaction shifts from time to time during the day, depending upon the intake of food. The occurrence of an alkaline tide after meals is one illustration of the fact that variation in hydrogen-ion concentration is in response to changes elsewhere which necessitate such an adjustment for maintenance of equilibrium.

Mineral acids and salts do have an effect on the acid base balance, but fairly large amounts must be administered. Thus,

Peters and Van Slyke have shown that 0.026 gm. of NaHCo3 per kg. (15 gm. for an average individual weighing 60 kg.) is needed to raise the plasma carbon dioxide 1 volume per cent. It takes 45 gms. of NaHCo3 daily to render the urine continuously alkaline.

Another mechanism for the neutralization and elimination of foreign acids consists in the production of ammonia from urea, a neutral substance. This ammonia seems to be formed chiefly in the kidneys and is used to neutralize foreign acids which can be eliminated as neutral salts.

TABLE 1.

Effect of sodium citrate administration upon the acid-base equilibrium of pre-breakfast blood.

Citrate Administration	Period	Urine pH	Blood Plasma[1]	
			$BHCO_3$	pH
			m.Mol. per L.	
Control	Initial	7.2	25.8	7.45
8 gm. citrate daily	7 days	7.8	25.6	7.40
Control	Initial	7.6	26.0	7.45
4 gm. citrate daily	9 days	8.0	25.8	7.45
30 gm. citrate daily	4 days	8.6	28.2	7.48
30 gm. citrate daily	22 days	8.4	27.9	7.48
30 gm. citrate daily	39 days	8.4	28.2	7.45
Control	10 days	6.8	26.5	7.45

[1]Recalculated for completely oxygenated blood at pH drawn.

Fig. I. Note constancy of pH of blood after large doses of citrate (Bischoff, Sansum, et al.).

While evidence (Bischoff, 1932) indicated that sustained changes in Co2 content and plasma PH of humans, outside the so-called normal limits, could not be produced by ingestion of foodstuffs, the possibility and significance of changes within this limit has not been eliminated. However, in a recent study, Bischoff, Sansum and others found no significant difference in the acid base picture of the blood of a normal individual, drawn before breakfast, whether the mixed diet consumed contained excessively acid or excessively alkaline ash foodstuffs. A diet containing 240, 204 and 93 grams of protein on consecutive days and 200 cc. of normal acid equivalent of ash daily produced a doubtfully significant shift in the blood picture to the acid side. Cullen and Earle have recently studied the normal changes in PH and Co2 during the course of the day and found that there is a definite tendency toward increased PH and Co2 content following meals. There are

marked exceptions and the changes are different in degree and regularity following the evening meal as compared to the noon meal. Thus one can see that no conclusive evidence is available to substantiate the belief that certain diets alter the acid base equilibrium of the blood.

Haldane showed that by taking 15-20 grams of NH4CL per day an acidosis could be produced. The daily administration of 45 grams of NaHCo3 was found necessary to change the reaction of the blood to a similar extent in the opposite direc-

TABLE 2.

Effect of ash variation in diet upon the pre-breakfast acid-base equilibrium of the blood.

		24 Hour Urine		Blood Findings (Plasma)[1]	
Diet	Period	pH	Titratable acidity	pH	$BHCO_3$
			cc. N/10		m.Mol. per L.
Usual	6 days	5.8 ± 0.15	234 ± 27		
Usual	4th day	6.2	295	7.40	29.0
Usual	5th day	5.8	200	7.41	26.9
Basic	9-days	6.0 ± 0.15	130 ± 31		
Basic	2nd day	6.4	68	7.45	27.2
Basic	4th day	7.2	98	7.41	28.8
Basic	9th day	7.2	113	7.44	29.2
Acid	9 days	5.9 ± 0.12	262 ± 17		
Acid	4th day	5.8	273	7.40	28.5
Acid	9th day	6.4	246	7.44	29.2

[1]Complete oxygenation.

Fig. II. Note constancy of pH of blood on acid ash and alkaline ash of diet (Bischoff, Sansum, et al.).

tion. It would require 18 lbs. of oranges to have an alkaline ash content equivalent to the 40 gram NaHCo3 and 4.5 lbs. of lean beef or 2 lbs. oysters to have an acid ash content equivalent to 15 grams of ammonium chloride. The equivalent NaHCo3 as alkaline ash of 1 pound of bananas is 2 grams. One quart of orange juice contains the alkaline ash equivalent of roughly 4 grams of NaHCo3.

In recent years the belief has been voiced by Jarvis and others that respiratory symptoms and pathologic changes in the respiratory system are brought about by faulty acid base metabolism. Jarvis and his group have expressed the opinion that the color of the mucous membrane of the nasal septum

is an index of the acidity or alkalinity of the body—pale septums being present in states of alkalosis and red septums in acidosis. They have been treated accordingly—if there is a pale mucous membrane the patient has been given a diet high

TABLE 3.

Patient	Clinical History	Color of Nasal Mucosa	pH of Blood Serum
1	Hyperesthetic rhinitis with usual complaints of sneezing, nasal block and watery discharge; duration two years	Pale, waterlogged	7.44
2	Hyperesthetic rhinitis; usual complaints as above; duration 17 months	Pale, waterlogged	7.41
3	Hyperesthetic rhinitis; usual complaints as above; duration three years	Pale, waterlogged	7.41
4	Hyperesthetic rhinitis; usual complaints as above; duration 18 months	Pale, waterlogged	7.46
5	Hyperesthetic rhinitis; usual complaints as above; duration two months	Pale, waterlogged	7.44
6	Hyperesthetic rhinitis; usual complaints as above; duration nine months	Pale, waterlogged	7.45
7	Hyperesthetic rhinitis; usual complaints as above; duration seven months	Pale, waterlogged	7.45
8	Acute sinusitis; duration ten days	Pale	7.38
9	Chronic right otitis media with cholesteatoma; duration seven years	Pale	7.38
10	Seasonal hay fever with pollen asthma	Pale, waterlogged	7.41
11	Seasonal hay fever	Pale, waterlogged	7.41
12	Bronchial asthma; duration four years	Pale	7.40
13	Polypoidal sinus disease; duration three years	Scarlet red	7.44
14	Postthyroidectomy; duration two months	Normal	7.37
15	Acute pharyngitis with cervical adenopathy; duration three days	Scarlet red	7.38
16	Chronic right otitis media; red septum symptom complex; duration two years	Scarlet red	7.45
17	Secondary laryngitis; red septum symptom complex; arteriosclerosis and hypertension	Scarlet red	7.48
18	Chronic right otitis media; red septum symptom complex; duration ten years	Scarlet red	7.48
19	Frequent attacks of sinusitis; red septum symptom complex; duration two years	Scarlet red	7.45
20	Subacute ethmoiditis; red septum symptom complex; duration one year	Scarlet red	7.41

Fig. III. Various clinical conditions—pale-red septum. Constant pH of blood (Bernheimer & Cohn).

in acid ash with dilute nitrohydrochloric acid, and if red they have been given an alkaline ash diet with NaHCo3.

In Jarvis' report there is no clinical or laboratory evidence to prove an abnormal acid base equilibrium.

Bernheimer and Cohn took two groups of patients and determined: *1.* Whether an abnormally red or pale color of the nasal septal mucous membrane actually indicate a state of acidosis or of alkalosis. *2.* Whether patients suffering from various diseases of the respiratory tract are benefited by placing them on an alkaline or acid ash diet, other factors remaining unchanged. No correlation could be found between the color of the nasal mucous membrane and the clinical symptoms of acidosis in fifty critically ill patients, all of whom showed clinical symptoms of acidosis with hyperpnea, dehydration and acetonuria.

TABLE 4.

Group Classification	No. of Cases	Average Per Cent CO_2 for Group	Highest Per Cent in Group	Lowest Per Cent in Group
Chronic purulent sinusitis—Mucosa red	16	60.4	67	53
Hyperplastic sinusitis (no pus)—Mucosa red	11	59.6	67	46
Allergic rhinitis (mucoid)—Mucosa pale	6	62.3	69	55
Allergic rhinitis (no secretion)—Mucosa pale	6	60.2	66	55
Combined allergy and sinusitis	9	57.5	69	52
Acute rhinitis	5	61.9	67	57

Fig. IV. Alkali Reserve of Blood in Nasal Conditions (M. Fineberg).

In one hundred normal subjects and in twenty patients with various diseases but with normal hydrogen-ion concentration of the blood there were found all three types of septal mucosa—pale, normal pink and scarlet red.

They concluded that diets high in foods producing alkaline or acid metabolic products together with the adjunct therapy failed to influence the symptoms of conditions.

Fineberg studied fifty-three cases of various types of nasal conditions in relation to their carbon dioxide combining power. Realizing that it is difficult to alter the PH of the blood due to the buffer action of the carbonates and also it is difficult to interpret minor changes in the almost constant PH, he resorted to measuring the carbon dioxide combining power of the blood which is an exceeding sensitive indicator. In no case was the alkali reserve outside the limits of normal.

He concludes that while clinically empiric treatment of nasal affections may be based on the color of the nasal mucosa, the benefits are due to any direct relation on the acid alkali equilibrium of the blood.

In the total metabolism of the human, minerals play an important part. Much is known about their specific roles and the chemical processes involved. It would be too time consuming to even give a mere outline of this, but I would like to discuss a few phases of calcium metabolism.

TABLE 5.

Normality of Nitrohydrochloric acid, dilute, bought on prescription	U.S.P.	1.9
For comparison		
Normality of Hydrochloric acid, dilute or 1.45 times that of the purchased sample of dilute nitrohydrochloric acid.	U.S.P.	2.74
1 c.c. dilute nitrohydrochloric acid is equivalent to .16 grams or 2½ grains sodium bicarbonate.		

Fig. V. Analysis of two prescriptions bought from reputable pharmacist.

Calcium occupies a peculiar position among the inorganic metabolites of the body. Calcium carbonate and phosphate form the rigid supporting structure of the osseous tissue, calcium salts are precipitated in certain pathologic conditions in other tissue and organs. Calcium has a peculiar influence upon the excitability of the motor system of animals, it is indispensible for the normal clotting of blood and it is distinguished from sodium and potassium by the fact that the calcium ingested with food is excreted predominantly by the bowel, only a small part appearing in the urine. Ordinarily in the adult 65 per cent to 75 per cent of ingested calcium passes out in the feces.

Absorption of calcium is in general promoted by factors which tend to keep calcium in solution in the intestine. If a disproportionately large amount of phosphate is fed, the fecal calcium loss increases because more of the insoluble calcium phosphate is formed. On the other hand, anything which tends to promote an acidosis or to provide a more acid medium in the small intestine exerts a favorable influence on calcium absorption because it transforms the insoluble salts into soluble salts. Calcium absorption apparently takes place chiefly

in the upper intestine where the reaction is relatively or actually acid.

It is not easy to raise the concentration of serum calcium far above normal by feeding calcium salts or high calcium containing foods. Intravenous or subcutaneous injection of calcium salts in amounts ordinarily prescribed is futile. If at all used they should be given in very large doses—5 grams four or five times daily—about four hours after meals or one and one-half hour before meals—this being necessary because the small intestine is least alkaline at this time.

The work of Sherman and others show that a minimum intake of 0.45 grams of calcium fits the actual daily requirement for an adult person. Many articles have been written treating of the deficiency of the American dietary, but a recent contribution by Sherman states: "When the results of 224 presumably typical American dietary studies were calculated to the usual basis of nutrition per man per day, the average protein content was found to be 106 grams or 140 per cent above the indicated maintenance requirement of 44 grams, while the average calcium content was 0.74 grams or 64 per cent above the actual minimum of 0.45 grams."

Ullman feels that a high calcium intake is necessary and states that the relation of calcium to the other anions, such as sodium, potassium and magnesium, has been overlooked. He therefore recommends a high calcium, low sodium chloride diet. He further contends that calcium absorption is inhibited in the presence of Na., Mg. and P., and that the anion sodium is responsible for the hydration of the diseased tissue. Furthermore, he states: "Every acute congested condition, with which we always have to deal in acute as well as chronic sinus diseases, will react markedly if by restricting the intake of sodium chloride the dehydrating component of this measure is brought to the maximum. In other words, the stricter the salt restriction in acute infections and swellings, the better the result. For less acute and chronic cases the restriction of sodium chloride will not be as effective by its dehydrating power alone but will act through the relation of sodium to calcium."

The knowledge of the metabolism of magnesium and potassium is too meager and controversial to draw any conclusion

about their role in disease. On the other hand, much is known about sodium chloride metabolism and especially in relation to edema, but as yet no controlled evidence has been advanced to show that alterations of sodium chloride metabolism affect localized areas.

The reciprocal relation of sodium and calcium in the body is little understood. It would seem that before we can talk about this factor of the diet, less polemical information must be obtained about calcium itself. On the other hand, much is known about the fate of sodium chloride in the body and only quantitative metabolic studies will place this type of therapy on a rational basis.

In conclusion one can see:

1. That there are fairly definite automatic regulatory chemical functions in the normal adult.

2. That it is unlikely that variations of diet affect the PH of the blood and only slightly affects the Co2 combining power.

3. That the diets as advocated by Jarvis and others should base their efficacy on some other action rather than alterations of acid base equilibrium.

4. That if one feels that certain nasal conditions are related to acid or alkaline tissue reactions, that large doses of NH4CL or NaHCo3 should be used.

5. That the average mixed diet contains more than the minimum calcium requirement.

6. Finally that possibly the diets as advocated will help fill the graveyard of the other deceased forms of treatment of obstinate nasal conditions.

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FOREIGN BODIES IN THE FOOD AND AIR PASSAGES. A PLEA FOR EARLY, DELIBERATE AND CAREFUL EXTRACTION.*

DR. JOSEPH W. MILLER, New York.

In this paper I shall attempt to give the reader interested in this specialty some important data gathered in the last ten years in coping with the removal of various foreign bodies from the food and air passages. I am cognizant of the fact that volumes have been written on the subject and the technique of endoscopic removal of foreign bodies adequately covered and minutely described. Yet, those of us who are called upon frequently to remove foreign substances from these passages know and have it in our minds that each case may present a different problem. What bronchoscopist did not have the experience of finding both in the food and air passages foreign bodies, even large meat bones, which were not detected by the X-rays? How many foreign bodies were removed from these passages which did not give any subjective nor even objective symptoms of a foreign body and were nestling there for years unrecognized? Who is the esophagoscopist that did not have in his own experience, or observed by others, esophageal tragedies? Esophageal perforations, secondary infections, abscess formations and injuries to the mucous membrane following the removal of foreign bodies occur occasionally in the hands of the best of us.

Only recently it dawned upon me to remove by suction from the oral cavity the accumulated saliva which wells up during esophagoscopy. The presence of the tube in the esophagus not only prevents the patients from swallowing, but stimulates the salivary glands to excessive secretion, which soon accumulates and rises to the point of overflow. Before this was recognized, I had the sad experience of observing in several cases either a partial or total collapse of a lung. In other cases,

*From the combined services of the Beth Israel, Beth David, Sydenham and United Israel-Zion Hospitals.

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aspiration or "schluck" pneumonia followed from the overflow of saliva into the bronchial passages. These cases were all proven by the sudden appearance of stormy subjective symptoms, pronounced physical signs and definitely estab-

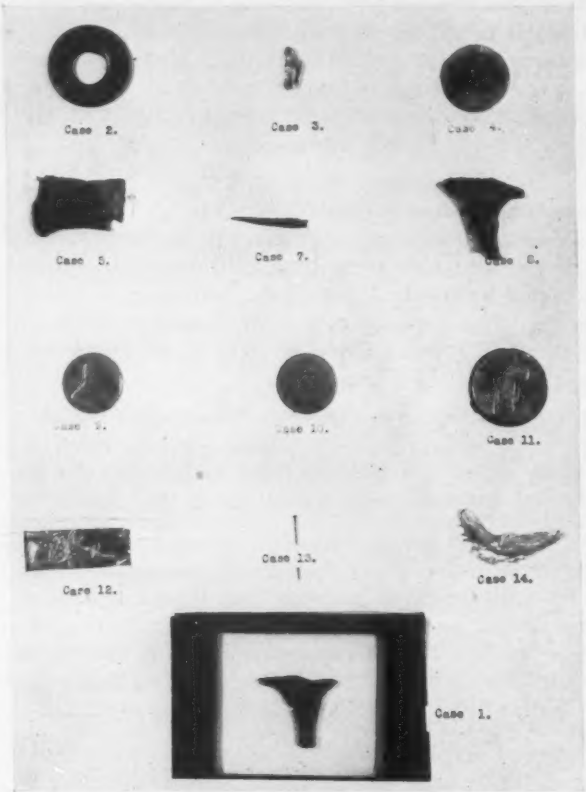

Fig. 1. Various foreign bodies removed from the food and air passages.

lished by the X-rays. In such cases immediate bronchoscopic suction is the best surgical procedure. The patient should then be placed in the Trendelenburg's position for several days. Since I have instituted this precaution of keeping the oral cavity and cavum free from saliva during esophagoscopies these accidents no longer occur.

Because each foreign body may necessitate a different procedure, I shall give in brief the technique of each with the description of the individual case report. However, I have laid down a definite rule to follow in all cases of esophageal foreign bodies and this is to tilt the table in the Trendelenburg's position. In this position the foreign bodies are not so apt to slide down into the stomach when the esophageal walls are dilated by the tube end of the scope. Nothing is more discouraging than to see a foreign body slip down before your very eyes when the pressure is released from the foreign body by the approaching esophagoscope.

In a previous paper on the subject,[1] I reported 17 cases of foreign bodies removed from the food and air passages. There I laid special stress that esophagoscopy is much more difficult and dangerous to perform than bronchoscopy, especially in infants and the aged. Since then I had two more esophageal tragedies which bear out the above statement and which I hope will add weight and shed light to all those who may come in contact with such cases.

My observation in the previous report that patients with upper dental plates have difficulty in detecting foreign bodies and easily aspirate or swallow them stands out more conspicuously and discloses further evidence in this paper.

I should like to emphasize one more point and that is never to rely on negative X-ray findings in foreign body cases. I have been disappointed so often that I have learned to disregard it and pursue the same course as if X-rays never existed. By far the greatest majority of foreign bodies, including meat and chicken bones, which I removed both from the food and air passages, failed to be identified by the X-rays.

REPORT OF CASES.

Case 1: Mrs. I. G., age 50 years, admitted to the Beth David Hospital on Nov. 12, 1930, complaining of a sticking sensation in the throat of three weeks' duration. Her family history and past personal history were irrelevant. Three weeks prior to admission, while eating her dinner, she swallowed a chicken bone which remained stuck in her throat. On swallowing she had a sticking feeling on the right side of the

neck which later on was referred to the left. The patient at once visited the emergency room, where an inspection of the throat failed to reveal any foreign body. She was advised to enter the hospital, but refused. Since then swallowing became progressively more difficult and painful, especially so with solid food. In distress, she came pleading for admission to the hospital.

Roentgenologic examination showed a foreign body in the esophagus at the level of the seventh cervical vertebra. The foreign body is about an inch wide and two inches long, and is parallel with the long axis of the esophagus.

Esophagoscopy was performed under local anesthesia, using 20 per cent cocaine, to which a few drops of epinephrin solution were added. A short Mosher-type oval adult esophagoscope was passed and a foreign body located in the lumen of the esophagus about eight and one-half inches from the upper teeth. The foreign body was then grasped with a Jackson alligator forceps and, as the pointed ends of the horizontal portion of the invader were imbedded in the walls of the esophagus, these had to be dislodged first and then removed carefully so as not to further injure the walls of the esophagus. This proved to be a thin, flat chicken bone, T-shaped and measuring one inch wide and one inch long. The wounded walls of the esophagus were touched up with 95 per cent alcohol. The postoperative course was uneventful and the patient was discharged cured on Nov. 15, 1930.

Case 2: This case is that of a colored boy, age four years, admitted from the emergency room to the hospital with a history of having swallowed a button on Dec. 5, 1930.

His family history and previous personal history is of no importance in this case. The main points are that he swallowed a button and soon began to vomit and retch. The child pointed frequently to the substernal region where he located his pain. He was able to swallow water and keep it down, but made no attempts to swallow food.

The child was admitted with a temperature of 99.6° and a pulse rate of 120 and respirations 20. With the exception of tenderness on deep pressure just below the xiphoid cartilage, he showed no signs of distress.

The X-ray revealed a ring-like foreign body in the cervical region of the esophagus immediately above the clavicular line.

Esophagoscopy was performed the following day without anesthesia, either general or local. The child was thoroughly wrapped in sheets and a 10 mm. Bruennings tube was easily passed through the cricopharyngeal constriction into the esophagus. At about two inches below the mouth of the esophagus a round metallic foreign body was encountered. By seizing it with the alligator forceps the foreign body was pushed forward and hemmed into the second constriction of

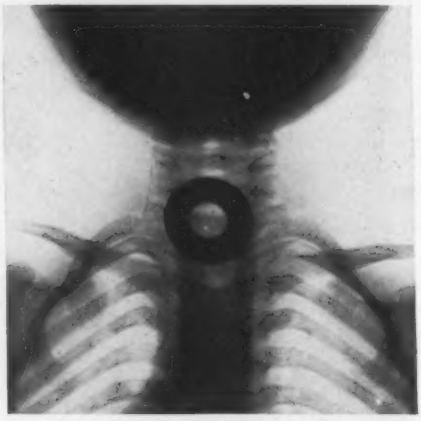

Fig. 2. Case 2. Flat metal ring (size of quarter) in cervical esophagus. Found hidden in the folds of mucous membrane.

the esophagus. Here it was hidden from view frequently because of collapse of the esophageal walls. I sat in watchful waiting and finally succeeded in grasping it with the Jackson alligator forceps and delivering it together with the tube. This proved to be a flat metal ring the size of a quarter with smooth edges and a large central perforation. The child made a speedy recovery and was discharged the following day.

Case 3: Case of foreign body in the left lung; pneumonia. Lawrence W., age four years, admitted to the Israel-Zion Hospital on Dec. 11, 1930, on the service of Dr. Gordon. His past history is not important except that he had an O. M. P. A. two years ago, which drained for three weeks, with recovery.

His present illness began suddenly on Dec. 4, with temperature of 104°, sore throat and abdominal pain and laboured respirations. The next day he improved, but on the day following, Dec. 6, respirations were again difficult with incessant cough, temperature 104.5° and repeated vomiting. Child complained of sore throat and this condition persisted until admission for pneumonia on Dec. 11 (seven days after the onset).

Physical Examination: Dec. 11, evidence of an acute rhinopharyngitis. Chest, right side shows greater respiratory excursion, which is also resonant. Left side reveals decreased resonance anteriorly and diminished breath sounds posteriorly. Dr. Murray Gordon: left lobar pneumonia, Dec. 15, 1930, entire left side posteriorly, flat, with absence of breath sounds. Dec. 20, 1930, condition unchanged; additional history at this time, swallowing tin foil 48 hours before onset of illness. Jan. 4, 1931, temperature normal; left side still dull to flat, especially in axilla. Bronchial breathing posteriorly. Jan. 7, 1931, miscellaneous rales over both lungs.

Bronchoscopy performed on Jan. 8, without anesthesia, either general or local. The child was thoroughly wrapped in sheets and a five mm. Jackson tube passed through the glottis into the trachea and turning left at the carina into the left main bronchus. Here a glistening metallic foreign substance was distinctly sighted in the distance and bobbing up and down with respiration. This was seized with a Jackson serrated forceps and removed. On close examination it turned out to be a rolled up piece of aluminum foil about two and one-half cm. in length and three mm. in thickness, which the child removed from a piece of chocolate. Recovery was now rapid and uneventful.

The X-ray findings were that of pulmonary infiltration, pneumonic in character, on Dec. 12 and Dec. 15. On the 20th, the report was a bronchostenosis, nonopaque foreign body or mucous plug. Aluminum throws no shadow to X-rays. The suspicion of a foreign body by the Roentgenologist is therefore praiseworthy.

Case 4: Sol. D., age 19 months, referred by Dr. Paul Tower on April 16, 1930. Five days prior to admission child swallowed a five cent piece and since then showed symptoms

of esophageal obstruction. He was very restless, regurgitated, vomited his food and showed signs of epigastric distress.

He was admitted to the Beth Israel Hospital. An X-ray was taken the same day and revealed a coin in the cervical esophagus.

Esophagoscopy without anesthesia, either general or local, brought forth a corroded five cent piece which was found buried in the folds of the cervical esophagus. Recovery was uneventful.

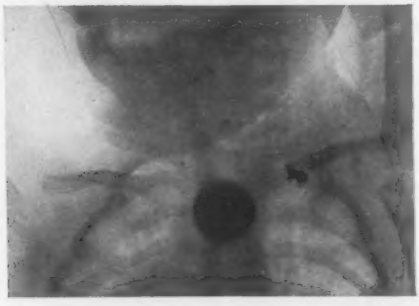

Fig. 3. Case 4. Coin (5 cent piece) found hidden in the folds of the cervical esophagus.

Case 5: I. F., age 48 years, referred by Dr. A. Noah Schiller on Dec. 13, 1931. While eating soup two days before admission he accidentally swallowed a bone. He was taken to the Beth Israel Hospital, complaining of severe pain in the throat, difficulty in swallowing and a choking sensation.

Fluoroscopy and plates taken with bismuth paste showed a definite foreign body in the lower cervical esophagus.

Esophagoscopy was performed the same day under local anesthesia, using a Seiffert side-ways opening esophagoscope. A large, hard, bony substance was sighted at about half an inch below the mouth of the esophagus. The sharp bevelled extremity was buried in the anterior wall of the gullet and the distal blunt and broader end was suspended free in the lumen. After pushing bone downwards so as to release it from the esophageal wall, it was seized with alligator forceps and removed. This proved to be a chicken bone 17 mm. in

length, eight mm. in width and four mm. in thickness. The wounded area was swabbed with 95 per cent alcohol and food withheld for 24 hours. No complications followed and the patient was discharged on Dec. 15, 1931.

Case 6: J. M.,[2] journalist, age 65 years, white, Hebrew; admitted to the Beth Israel Hospital on Jan. 9, 1932, with chief complaint of intense coughing of over one year's duration, with profuse expectoration.

Past history revealed pneumonia and peritonitis at 20. Varicose veins and ulcers at 60. Otherwise in perfect health and enjoyed full vigor of life. There is no history, even on careful questioning, of any inhalation of a foreign body, tonsillectomy or recent operation.

About one and one-half years ago he began to cough with profuse expectoration. Four months later he developed bronchopneumonia with fever, sweats, cough and chills. Was in bed for two weeks and returned to work in one month. Following this illness he was well except for asthmatic breathing and severe cough with marked expectoration of greenish material. Eight weeks before admission he developed chills, fever, profuse sweats; cough became worse with occasional foul and sometimes bloody expectoration. Temperature was septic in type with remission to 99° for three weeks, after which it became septic again. He lost about twenty pounds in ten weeks and became paler.

On admission, temperature was 103°, pulse 96, respirations 32. Examination revealed a chronically discharging left ear; upper and lower dental plates; barrel chest; diminished breath sounds at the right base with distant tubular breathing above this area; medium moist rales at left base and occasional rales at right base. Pigmentation of old varicose ulcers present on legs. Rest of physical examination essentially negative.

A lung abscess and lung neoplasm were considered as diagnostic possibilities on Jan. 9, 1932.

Laboratory Findings: Urine showed two plus glucose on one occasion. Blood count on admission, 3,840,000 R.B.C., with 62 per cent Hb., 14,400 W.B.C., with 82 per cent polys and three per cent staff cells. Sputum showed elastic tissue, many pus cells and many gram positive diplococci.

X-ray of chest, Jan. 11, 1932, showed effusion into lower portion of right pleural cavity. Posterior portion of right lower lobe showed evidence of consolidation. Pleura markedly thickened. Mediastinum and heart retracted toward side of lesion. X-ray diagnoses were: Pleural Effusion; Bronchopneumonia; Bronchostenosis; Lung Tumor.

On Jan. 12, 1932,, bronchoscopy was performed under local anesthesia, using 10 per cent cocaine and epinephrin solution. A Jackson nine mm. bronchoscope was inserted through the glottis, into the trachea and down to the carina. The trachea was found adequate and its mucosa markedly congested. The carina was found in the median line, thickened, obtuse and intensely inflamed. Due to the constant spasmodic coughing of the patient, I had difficulty in visualizing the bronchial landmarks. The patient's head was then fixed securely to the table and so we were able to explore the right main bronchus. Here we found the lumen narrowed, the mucous membrane inflamed and swollen, so much so that the underlying cartilaginous rings were not transparent. In the distance, at the bottom of the right main bronchus, I observed a mass entirely plugging its lower end. This mass was enmeshed in foul purulent secretion. Believing that I was dealing with a lung tumor, I used a cup-shaped forceps in order to secure a good-sized piece for biopsy. The alleged tumor was then seized and brought forth what proved to be an irregular curve-shaped chicken bone. After its removal the ever present hacking cough immediately stopped. The purulent material found at the bottom of the bronchus was suctioned off and the exuberant granulations from the inflamed area removed.

X-ray examination following removal revealed aeration of right lower lobe improved, but still present were interstitial changes at the base with marked pleural thickening and small effusion in the costophrenic space. Following bronchoscopy, patient felt subjectively better and although he ran an irregular fever, going up at times to 103°, he improved gradually and left the hospital on Feb. 2, 1932, for a country sanitarium, where he fully recuperated in a short time.

The important points in this case are: the bizarre course which the patient ran for a year; the inability of the X-rays to locate the foreign body; the asthmatic breathing and the dental plates.

Case 7: Mrs. Tillie F., age 48 years, admitted to the Beth Israel Hospital on Feb. 29, 1932, with history of having swallowed a chicken bone on Feb. 28, 1932. She complained of choking, vomiting, coughing and pain in the right side of the throat, with marked dysphagia.

Mirror laryngoscopy revealed a marked edematous swelling of the right aryepiglottic fold and arytenoid region. This swelling was continuous, with the mucosa of the larynx interior and false cord of the same side. The right cord was not visible. No foreign body was seen.

X-ray taken a few hours prior to esophagoscopy showed a small fragment of bone impacted in the posterior wall of the esophagus near the pharyngoesophageal mouth.

Esophagoscopy was performed on Feb. 29, 1932. The right wall of the upper part of the esophagus was edematous and swollen and bled easily on the slightest touch. On backing out with the esophagoscope, there was found a chicken bone one inch long, tapering down to a fine point. This was almost completely buried in the lateral wall of the esophagus, right below the cricopharyngeal constriction. The bone protuded only about one mm. above the surface. Patient had an upper dental plate.

Next day, mirror laryngoscopy revealed the same findings as on the first examination, except that the vocal cords were visible.

No untoward symptoms or rise in temperature developed in three days and the patient was discharged cured.

Case 8: Mrs. Beckie R., age 47 years, admitted to the Beth Israel Hospital on March 1, 1932, with a history of having swallowed a chicken bone on Feb. 26, 1932, followed by dysphagia and pain in right subscapular region on swallowing.

Mirror laryngoscopy was negative. Patient had upper dental plate.

X-ray was negative for foreign body.

On esophagoscopy, a firm body was encountered lying horizontally across the lumen of the esophagus and each end imbedded into the esophageal walls. After the secretion was suctioned off, the foreign body was grasped with a Jackson

alligator forceps, releasing the sharp points from the esophageal walls. The foreign body was removed together with the scope, which proved to be a chicken bone (flat breast bone) about two and one-half cm. long and two and one-half cm. wide.

No untoward symptoms or rise in temperature occurred after one day and the patient was discharged cured.

Cases 9 and 10: These are also identical. Both were of similar ages, 18 and 20 months, respectively. Both had similar coins in the upper esophagus. The symptoms, too, were identical. The children had difficulty in swallowing and what little went down was vomited up in short order.

The cent pieces were removed without anesthesia, either general or local, using in both cases the Kahler-Leiter infant-size esophagoscope. Both children entered the Beth Israel Hospital via the emergency room and are reported from the service of Dr. Samuel J. Kopetzky. Both children left the hospital on the next day following the esophagoscopy.

Case 11: A 25-cent piece lodged in the folds of the cervical esophagus.

Marvin A., age 7 years, referred by Dr. Roginsky on Jan. 27, 1932. Early that day, the child played with a "quarter" and accidentally swallowed it. The child soon complained of pain and a feeling of pressure in the throat. He vomited several times.

The same morning the child was taken to the operating room and without anesthesia, either general or local, the coin removed with alligator forceps and a Jackson's heart-shaped laryngoscope. Child left the hospital the same day.

Case 12: Meat-covered squab bone in the esophagus.

Pauline M., a married woman, age 47 years, was referred to me by Dr. Colbert on June 2, 1932. While eating boneless squab at a wedding feast she swallowed a bone. This gave rise to a sudden sharp pain in the left side of the throat and was followed by a sensation of choking and dysphagia.

The same evening she was admitted to Beth Israel Hospital and radiographed. This revealed a bone in the upper part of esophagus.

Emergency esophagoscopy was performed under local anesthesia, using 10 per cent cocaine hydrochloride to which a few drops of epinephrin solution were added. A Seiffert sideways opening esophagoscope was inserted through the cricopharyngeal constriction and at about an inch below this area a large bone, meat covered, was found located in the esophagus, piercing the left lateral wall and obliquely crossing the lumen. This was milked out from its bed and removed. Alcohol 95 per cent was then applied to the wounded area. She left the hospital on June 7, 1932, in the best of health.

Case 13: Common straight pin lodged in the larynx.

Miss May L., while at work on July 8, 1932, had a pin in her mouth and accidentally swallowed it. Her physician, Dr. Morris Kaplan, referred her to me with an X-ray film showing pin in the larynx. Her only complaint was a slight sticking pain on swallowing.

Mirror laryngoscopy revealed a pin in the right vestibule of larynx. Its head rested in the right ventricle and the pointed extremity stuck in the left aryepiglottic fold. After thorough cocainization, a Jackson's heart-shaped laryngoscope was passed, the pin dislodged and removed.

Case 14: Serrated fish bone removed from cervical esophagus.

Rebecca T., a married woman, age 39 years, referred to me by Dr. Felder on Oct. 5, 1932. She was admitted to the Beth Israel Hospital on the same day and reported that two days before she swallowed a fish bone which stuck in the throat. She went to a first class hospital and after X-ray examination was told that nothing could be found. Swallowing was extremely agonizing and pain radiated all along the left side of the neck. Temperature was 106.6° and pulse 100 on admission.

Esophagoscopy performed the same evening under local anesthesia. A Seiffert sideways opening esophagoscope was inserted through the mouth of the esophagus and a flat bone visualized a half inch below the cricopharyngeus constriction. The convex margin of the bone was imbedded in the left lateral wall, the concave margin and flat surface lay suspended in the lumen of the esophagus. Applying traction on the

bone with seizing forceps, I pulled the left lateral wall along with it. This mode of traction, therefore, had to be abandoned and an attempt was made to pull the bone medianwards. This proved successful and the bone was dislodged and removed. It was a half inch in width and about two inches in length. The convex margin was serrated, resembling a rooster's comb, the concave margin of the bone was sharp. Alcohol 95 per cent was applied to the wounded wall of the esophagus.

Following the esophagoscopy, the temperature dropped to normal and the pulse slowed down to 58. She left the hospital on the following day in a happy mood, although she still had a slight pain on swallowing.

Case 15: Beef bone in right main bronchus simulating asthma and emphysema.

Fig. 5. Case 15. Photograph of meat bone, concave surface, removed from right main bronchus.

A married man, age 49 years, presented himself to Dr. Joseph Grubman on July 9, 1932. His chief complaint was shortness of breath, severe cough with slight expectoration and a sensation of choking, especially so before he fell asleep.

Because of a rather vague or indefinite history of having "swallowed" a fish bone about two months prior to consulting Dr. Grubman, he was radiographed on several occasions with negative results. No tuberculosis, new growth or foreign body could be demonstrated.

Physical examination recorded by Dr. Grubman: A well-developed man with a brassy cough and a voice that seemed to be characteristic of laryngeal pressure. Lungs were hyper-resonant throughout, expiration prolonged and feeble, and

accompanied by squeaks and crackles, especially so on the right. Having consulted several outstanding clinicians without gaining any more light on the subject, Dr. Grubman decided on an exploratory bronchoscopy.

Accordingly, a diagnostic bronchoscopy was performed on patient, L. B., at the Sydenham Hospital on Nov. 25, 1932. Under local anesthesia, using 10 per cent cocain to which a few drops of epinephrin solution were added, a Jackson 9 mm. bronchoscope was inserted through the glottis into the trachea and down to the carina. These passages were found adequate and the mucosa normal.

Fig. 6. Case 15. Photograph of convex smooth surface of same meat bone.

Entering the main bronchus, we found a mass almost blocking the entire lumen. This mass appeared to be enmeshed in sanguinopurulent secretion and seemed to be attached to the left lateral wall of the right main bronchus. It had a cauliflower appearance with a necrotic center.

After the purulent secretion was removed by suction, the mass was sponged dry with cotton applicators and instead of the apparent cauliflower mass it now began to look like a hard bony substance. No sooner was the cup-shaped forceps applied to the mass in an attempt to take a biopsy when I realized I was dealing with a foreign body. After several trying attempts I succeeded in delivering an irregularly shaped meat bone with very sharp edges. It was about an inch in length, one-half inch in width and about one-fourth inch in thickness. The concave surface was irregular and rough; the convex surface was rather smooth.

This bone had to be delivered with the bronchoscope and all, because it was larger than the lumen of the bronchoscope. Slight bleeding followed the removal of the foreign body, but the cough soon ceased and the patient left the hospital on Nov. 27, 1932, entirely well.

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THE SPHENOID SINUS.*

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The sphenoid sinus arises primarily and is essentially closely associated with the cartilaginous nasal capsule. Genetically, according to Shaeffer, it is demonstrable as early as the fourth month of fetal life. Shaeffer also states that, "It must be clearly understood that no portion of the fetal sphenoidal sinus is contained within the sphenoid bone. And that it is necessary that resorption of the intervening nasal capsule takes place before the terminal nasal sinus or early sphenoidal sinus can come into actual contact with the body of the sphenoid bone." It is thus easily visualized that the fetal sphenoidal sinus is a constricted portion of the nasal fossa and that the proximal end of the constriction remains as the ostium of the sinus and is therefore necessarily located in a superior position to any of the concha or turbinates which develop.

Up until the third year the sphenoidal sinus is nasal in position, rather than sphenoidal, and it is after this period that the rudimentary sinus is surrounded by bone, rather than the ostium, enlarging into a sinus through reabsorption of the sphenoid body, which takes place much later, toward the fourth or fifth year. The adult sphenoid is a cavity directly in the body of the bone and occupies almost a central position in the skull, varying in size according to its development. The pneumatization is exceedingly variable, frequently extending into the pterygoid processes and the lesser wings of the bone. Should the pneumatization extend into the lesser wings and the anterior clinoid process, then the sinus encroaches upon the optic nerve, and I have seen three cases in which the nerve was within the sinus cavity. Should the pneumatization continue, very large sinuses with walls of paper thinness may result and we can readily understand the orbital and cranial complications, the result of empyema

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occurring in these cavities. Although an absence of the frontal and maxillary sinuses is sometimes met with, seldom do we see a complete nondevelopment of the sphenoidal sinus. Several, however, have been reported. The usual findings have been of asymmetrical cavities, one much greater in extent than the other. The average capacity according to many investigators seems well established and is placed at from 5 to 6 cm.

Skillern and Hajek compare the sinus to a cube having six sides or walls, namely, the anterior, posterior, superior, inferior, the external and internal. Of these, the most important rhinologically is the anterior. This is so on account of having the ostium and also as the only wall which may be used for operative measures. This wall is seldom perpendicular but points downward and backward in an angular direction, increasing in thickness as it descends. The ostium, situated in the upper third of the sinus, is visible only where we have a lack of space between the sphenoid and posterior ethmoidal cells. In other words, should the posterior wall of the ethmoid be the anterior wall of the sphenoid, then the ostium may be seen more or less in the medium line, but should we have a sphenoidal-ethmoidal fissure, then according to its depth will be situated the ostium in such a position that normal visualization of the opening is impossible.

Closely associated with the superior wall, we have the right and left optic nerves and the optic chiasm. Above or slightly posterior, the coronary sinuses and pituitary body in the sella turcica. Within the mucous membrane covering the anterior inferior wall we have the pharyngopalatine artery. This artery is quite large and when torn or cut causes frightful hemorrhage.

The external wall helps to form a portion of the middle cerebral fossa and is, therefore, in direct communication with the cavernous sinus and internal carotid artery. Unfortunately, as the development of the sinus increases in size, this, the external wall, becomes thinner and thinner, sometimes disappearing entirely, leaving only the periosteum or a dehiscence in places. Numerous perforations or openings are formed for the passages of small venous capillaries which anastomose with the cavernous sinus at this locality.

Situated as it is, the sphenoid sinus occupies a position which, when diseased, may and does give rise to a complexity of symptoms.

Sphenoid sinusitis as outlined by various authors is divided into two classes: that of the acute and chronic varieties. The chronic infection is subdivided again into *a.* those with free drainage; *b.* those with deficient drainage.

The various symptoms associated with the acute infection, according to Skillern, are subjective, objective and ocular. Under the subjective we have pain, inability to concentrate, forgetfulness, aversion to mental or any work, cough, lassitude or malaise, anorexia, lack of interest in anything, vertigo, etc. Under the objective we put discharge, cacosmia, crusts or pus on pharyngeal wall with probably a more or less proctosis of the eye. The ocular symptoms might be an enlargement of the blind spot, scotoma, either of the scintillating, spot, or hair, or feather varieties.

While the majority of patients suffering from this disease have one or more of these symptoms, others suffer from peculiar symptoms seemingly unassociated with the sphenoid. The etiological factors of the history of an infection as given by the patient may be of considerable value in aiding one in the diagnosis of an acute infection, although of very little value or help in a chronic condition.

In a paper read before the meeting at Atlantic City in 1927, I stated that we must remember that in all acute infectious diseases, the mucous membrane of the upper respiratory tract is involved; that scarlet fever, scarlatina, measles, pneumonia, pertussis, influenza and repeated attacks of coryza frequently leave a latent or lingering aftermath in the mucous membrane or tissues adjacent to it. A series of over 100 cultures taken from the nasopharynx by Dr. Myer Solis-Cohen and myself have proven to me beyond a doubt that many of these germs reside in the mucous membrane months after the disease has apparently been cured. This may be a factor in an infection of this sinus when a history of an acute infection is lacking.

I have been criticized on several occasions due to the suggestion which I have made on numerous occasions as to the advisability of opening the sphenoidal sinus when only few

and vague symptoms are obtainable to justify our operative procedure instead of the positive objective or visual justification of empyema and pus. My only answer to those criticizing such procedures is that they evidently have not had as much experience in sphenoidal work as has fallen into my hands, or else they fail to realize that we can and do have the most virulent symptoms of any disease from anaerobic infections. It is not so difficult to visualize a virulent infection of a mucous membrane with its consequential swelling, to understand the closure of a small ostium, which, when due to the circulation consumes all oxygen in the cavity. We now have a typical and idealistic condition for the growth of cultures and bacteria organisms whose requirements for oxygen is *nil* and our knowledge of medicine and bacteriology is of decided usefulness in remembrances of infections of the most virulent character, which are of anaerobic origin. Should an example be necessary, one should only have to remember the resultant ravages with tetanic infections.

The diagnosis of sphenoidal disease cannot always be made by the normal routine examination. The fact of having a condition present which may be caused by a sphenoidal infection is quite sufficient to cause pause and thought directed to this area even with an apparently normal nose. I feel we all are many times at fault when without a most thorough history taking and examination we give an opinion of no infection, no disease of this most important sinus. The main reason why cults of various kinds wedge in our profession is because we are negligent and do not examine our patients sufficiently nor do we take as much interest in the majority of cases as we should.

To make the necessary examination requires time, patience and persistency; all of these to be augmented with the scientific and personal desire to arrive at a truthfully correct diagnosis. The first essential is to examine all parts of the nose, making mental or written notes as to the conditions found. Next, a shrinking of the mucosa with a weak cocaine solution, waiting until the shrinking is complete, which requires fully ten minutes. A second examination with the touching up with a stronger cocaine solution (5 or 10 per cent) of various areas which have not responded to the first solution. It will also be advantageous to apply this stronger

solution between the middle turbinate and septum and anterior wall of the sphenoid. Do not use adrenalin or other drugs of this character in the making of your examination. While waiting for a complete cocainization, a careful post-rhinoscopic examination should be made, as well as the condition of the mouth, tonsillar areas and larynx noted. Note that in some cases of postnasal dripping the pus may and does lodge in the pyriform sinus with resultant ulcerations, fistual foundation or a perichondritis. I have seen several cases where this has happened.

When cocainization is complete, then we use the pharyngoscope and either with this means or by the use of the Skillern probe find the ostium of the sinus. As before stated, the deeper the sphenoethmoidal recess, the more external the ostium will be located. It will frequently be necessary to bend the probe at an angle to enter those so located. When this is done a bead of white pus may be seen by the aid of the pharyngoscope placed in the other nostril and directed to the examined side; drainage continuing along the shaft of the probe. In other cases, those of an anaerobic nature, as soon as the probe enters the sinus cavity a slight noise may be heard by the patient and doctor, caused by the inrush of air into the cavity, with sometimes an immediate cessation of all symptoms.

Knowing the position of the ostium, the sinus can now be irrigated, the patient holding the head forward to prevent the lavaged material from going down the throat. Should a Roentgen ray study be made, it can be done at this time with either the silver probe left in the sinus or a radio opaque oil injected into the cavity.

Taking up the symptoms of sphenoidal empyema, let us first consider those associated with our first division.

Acute Infections: As far as I recall I have never been called on to treat acute sphenoiditis *per se*, that is without the rest of the nasal mucosa being to a more or less extent involved. We have opened many sphenoidal sinuses when the lining membrane was acutely inflamed, giving an intensely red appearance. With this condition, however, we have had associated a general inflammation of the mucous membrane of the sphenoethmoidal fissure and the membrane covering

the superior and posterior end of the middle turbinates. It is, therefore, doubtful if we ever see an acute sphenoidal infection. We do see many acute exacerbations of a chronic sinusitis; this is the usual case which is referred to the rhinologist. There are acute infections associated, as before stated, with other choanal inflammation, the symptoms of rather decided character. Let us first consider:

Pain: This phenomena may be divided into various forms of headache, due to pressure, and reflex or toxic manifestations. Headache depends largely upon the pathologic condition present within the sinus. The pressure, whether the result of congested and swollen membrane impinging on its fellow membrane, or through a tenacious, mucilaginous pus filling the sinus cavity and occluding the ostium, is likely to give symptoms of similar nature. The third form of headache is the so-called vacuum headache or those where we have a negative instead of a positive pressure.

It may be true that it is an impossibility to have a negative pressure or closed cavity without the mucous membrane of the sinus being inflamed but this does not prevent the mucous membrane of the sphenoethmoidal fissure or a postethmoidal cell through swollen tissue or polyp formation occluding the ostium of the sphenoid from outside.

The headache is mainly situated in the occipital region, radiating in fan-shaped formation upwards toward the vertex. Reflex pain of toxemic or other origin may extend over the mastoid region, simulating in character and severity acute mastoiditis. This pain accompanied frequently with considerable muscular stiffness in the neck muscles may extend downward toward the clavicular region or as far as the humerus-scapular-clavicular articulation. This symptom first suggested by Sluder as one of the symptoms of his original paper on lower third headaches, has been further commented and written upon by Fenton and Fay. Later investigation has revealed the anatomical knowledge of the sympathic nerve fibres associated with the carotid artery and sheath, pressure exerted over this region producing or increasing sphenoidal pains when this sinus is diseased.

Many other reflex pains have been found associated sufficiently often to add to the likely symptoms. Two of these

which were originally brought out in my former paper are, first, a reflex pain felt over the canine tooth of the side affected. Second, pain of a burning or continuous stab-like character felt at the junction of the soft palate with the anterior pillar of the faucial tonsil. A third which I now add and which is so frequently encountered I can no longer neglect it, is a dull, sickening pain of continuous character felt over the pyriform crest. Another pain which is of considerable distance away but cannot be classed arthritic, as it has occurred too frequently as associated pain, is one of lancinating character over the instep.

Pain back of the eye. This is dull in character, and gives a feeling of pressure exerted from behind forward. This symptom or pain is not increased by pressure made over the eyeball or lid.

Vertigo: This is present either in a continuous or interrupted nature. It is manifested whether the patient is in the recumbent or the upright position, and may be so pronounced and distressing in character as to cause a fall or, if appearing at night, that a firm hold of either side of the bed may be necessary to prevent falling out. Should a bilateral involvement of virulent toxemia be our problem, the vertigo may be characterized by a rotary as well as lateral motion. Rapid changing of the angle or turning of the head produce symptoms from which the patient may have considerable difficulty to prevent falling. A peculiarity of gait is noticeable in some cases. An optical illusion or instability of the buildings leaning toward the center of the street has been cited by many of my patients as well as their tendency toward walking curbwise and difficulty in keeping to a straight line.

Sleeplessness: In spite of the general toxemia present the majority of sufferers are unable to sleep with any degree of comfort. A feeling of something breaking or discharging into the throat periodically renders frequent wakenings with fear of suffocating and renders their nights miserable. This periodical discharge is typical of sphenoidal infection and is due to the swollen membrane of the ostium acting as a valve until the pressure within becomes sufficiently great to force an opening, when a certain amount of pus is discharged; the membrane closing again to be forced open when the pressure is again exerted.

Cough: This most persistent symptom and annoyance is always present; is spasmodic and of a throaty character. A sensation of tickling similar to that associated with hypertrophy of the lingual tonsil is felt. This sensation persists until a partial clearing of the mucous and pus is brought about by hacking and expectoration.

Malaise and forgetfulness with inability to concentrate or take interest in their surroundings or work or play are symptoms usually elicited. These are the subjective symptoms we have found associated with the acute infection of this sinus.

The objective symptoms are few and mainly consist of congested postethmoidal mucous membrane and swollen tissue in the sphenoethmoidal fissure with possibly a discharge discernible in the olfactory fissure and on the pharyngeal wall, or we may see the discharge coming from the sphenoid ostium either with or without the pharyngoscope. A temperature of 99½° or 101½° is usual for this infection.

Perhaps no other sinus presents such a wide deviation in the subjective, objective and toxic symptoms as the chronically diseased sphenoid. I have divided these various symptoms into several groups.

First, the objective: Should a secretion be present it is either seen coming direct from the ostium or as a tenacious discharge of a dark yellow or greenish color clinging on the pharyngeal wall. This discharge quickly changes into scale or scab formation and may by capillary attraction invade the olfactory fissure as well as the choana. The typical cacosmic odor is perceptible on the breath as well as from the nasal chambers. Enlargement of the blind spot is also a condition to look for. Paralysis of the external ocular muscles or muscle may occur.

The mucous membrane when cleaned will be found to be hyperplastic in nature.

Second, the subjective symptoms will be divided into: *a.* Pressure symptoms; *b.* Mental symptoms; *c.* Ocular symptoms; *d.* Toxic symptoms; *e.* Olfactory disturbances; *f.* General systemic disturbances; *g.* Complications.

a. Pressure symptoms radiating in various directions may be due to, first: pressure of the secretion or swollen mem-

brane within the cavity, or, second: to mechanical pressure from the actual edema of the parts from venous stasis, or, third: to the cavity containing benign or malignant growth, as polyps, angioma, etc.

Pain from symptoms of the first and second groups occurs periodically, lasting from one to several hours, but does not leave entirely. Pain from the third group gives rise to a continuous symptom of pain which is not relieved by position or ordinary medicinal treatment. Of these pains, headache radiating in the same manner as mentioned in the acute variety is present in the majority of cases.

Pain back of the eye is more constant and pronounced. The character of these pains depends entirely upon the pathological condition encountered, and may be described as dull, throbbing or semithrobbing, or combined. It may be diffused, not corresponding to the area of distribution of any special nerve. Any physical exertion such as walking or running, or the use of tobacco or alcohol, will increase this symptom.

Mental excitement seemingly adds oil to the fire. Cohabitation is practically impossible, due to the excessive mental excitement and the depressed general condition.

b. Mental Symptoms: These and the *d.* toxic symptoms should be considered together, as it is due to toxemia we have the disturbances in loss of memory, dullness of faculty, general depression, malaise, inability to concentrate, aversion to work and lack of initiative, etc., whereas the toxic symptoms are usually considered as those occurring at distal points. Of these, vertigo with stiffness of the neck muscles, both at the sides and back, are probably the most frequent. Those producing pain over the canine tooth, palate, glossopharyngeus muscle, in the muscles of the leg, over the instep (simulating the pain of flat foot), tinnitus aurium with diminution of hearing, are less frequent, although any one or a combination of several may be the only diagnostic factor of our case.

c. Ocular Symptoms: Frequently conditions occurring in the eye or vision are the causative factor for patients to be referred to the rhinologist or sinuologist. Two cases, the report of which was part of my former paper, were referred to us on account of sudden blindness in one eye; all other

symptoms usually associated with this infection being absent. Examination, however, revealed a chronic sphenoid infection with an apparent acute exacerbation of the old condition. These two and four other cases of similar nature have come under our observation in the past four years in which acute blindness has been the only symptom elicited from the patient.

Sudden unilateral blindness may be due to compression of the optic nerve in the optic foramen or by perineuritis or toxemia.

Exophthalmos with or without edema of the conjunctiva may be present to a small or large degree. Many of our cases show the eyeball completely dislodged from its socket.

Hair, spots or scintillating scotoma and diplopia are frequent manifestations. In one of our cases, polyopia of seven images was the outstanding feature. Several cases have been referred to us whose diagnoses have been detachment of the retina in which proper opening of the sinus with elimination of the pus and toxic material resulted in the adherence of the retina to its underlying tissue and the return of almost normal vision.

e. Olfactory Disturbances: Due to the mucous membrane in the olfactory fissure and that covering the septal side of the middle turbinate and septum being congested and frequently covered with pus. Olfaction or the sense of smell is diminished or lost entirely.

f. General Symptoms: Sore throat, laryngeal cough, aphonia, hoarseness, bronchitis, gastric disturbances, such as loss of appetite, tendency to vomiting; this may be due to gastrointestinal disorders, or a hacking and retching to dislodge the nasal pharynx of the tenacious secretion and adherent crusts.

Hepatic and gall bladder infection with a new symptom, a yellow colored soft palate is frequently met with. This must essentially be viewed by daylight and not by our usual source of reflected light. Pain over the instep is also to be associated with this disease, as I originally pointed out under the acute symptoms.

g. Complications and Sequela: Thrombosis of the cavernous sinus. Due to the intimate anatomical relation between

these structures, the cavernous sinus may become readily infected. Retrobulbar neuritis with sequela of partial or complete loss of vision is a complication too frequently met. Basal meningitis is observed more frequently than thrombosis of the cavernous sinus and I have never seen a case, whatever the treatment may have been, get well. Occasionally we meet with a case which has been treated surgically, a large opening in the anterior wall with free drainage being made, and yet our symptoms or some of them return in a short time, after their complete disappearance.

Examination by the pharyngoscope reveals the opening closed either by the mucous membrane acting as a curtain or the former sphenoid cavity partially or entirely filled with granulations, pus or discharge oozing from the sinus or tissue within.

18th and Chestnut Streets.

CEREBROSPINAL OTORRHEA. REPORT OF TWO CASES (REVIEW OF LITERATURE).*

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Philadelphia.

The subject of this communication is to bring to your attention two cases of cerebrospinal otorrhea. The cases herein described are of special interest for the following reasons:

The first, is a case of nine years' duration, and the second, an acute case that occurred without any X-ray evidence of a basal fracture, and in which drainage lasted but twelve days.

Most cases of cerebrospinal otorrhea are acute in onset and generally follow a fracture of the skull, more specifically of the middle fossa. In these cases there is a mortality of approximately 50 per cent.[1] In cases that recover, the drainage usually lasts from ten to 12 days.

Murphy,[2] in a report since 1924, describes a series of cases of cerebrospinal otorrhea. Of 14 cases, four did not recover from the initial shock and in ten trauma was definitely localized.

Roth,[3] in a careful review of the literature, stated that he was unable to find a report of any case where cerebrospinal fluid was not due to a fractured skull; however, he reports a case of spontaneous cerebrospinal otorrhea, of six years' duration, where the patient suffered from chronic suppurative otitis media.

More recently Oram Klein[4] reported a case of spontaneous cerebrospinal otorrhea, in an elderly patient, without a history of fracture or suppurative otitis media; death occurred soon after due to meningitis. These are the only two references we were able to find where this condition occurred without a history of trauma.

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*From the Department of Otology, Temple University, School of Medicine. Read before the Philadelphia Laryngological Society, Feb. 6, 1933.

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The subject of fracture of the skull has, because of the frequency of its occurrence, often been mentioned. Its great importance is due to its high mortality rate, which, however, has been considerably reduced by modern therapy. In fractures, especially those involving the middle fossa, the neurosurgeon and the aurist have great opportunity for teamwork. The following statistics are enlightening and indicative of the frequency of hemorrhage and escape of cerebrospinal fluid from the external auditory canal in cases of basal fractures.

Howe[5] quotes Mygind, who states that in cases of head injury, otoscopic examination revealed traumatic changes in the drum in not less than 50 per cent of the cases, including those where the middle fossa was not involved.

There are three main types of temporal bone fracture. The first, longitudinal, is parallel and anterior to the pyramid of the petrous portion. The second type is the transverse fracture through the thick base of the pyramid; the third, the avulsion of the tip of the pyramid.

Gurdjian[6] reports that in a series of 2600 cases of fracture of the skull (from the Receiving Hospital, Detroit), 476 cases had bleeding or cerebrospinal fluid leakage from either one or both ears. Tabulation disclosed that the left ear was more frequently involved. Unilateral bleeding showed a mortality of 38 per cent and bilateral bleeding 67 per cent. In cases of cerebrospinal fluid leakage, the mortality was 50 per cent.

A. Beasley,[7] in a series of 1000 fractured skull cases, reports the following: Blood and spinal fluid occurred from the ear in 316 cases, or 31.5 per cent; from the right ear in 131 cases and from the left ear in 146 cases, and in 18 cases it was not stated. Unmixed cerebrospinal fluid from the ears occurred in 2 per cent, or 21 cases; from both ears in three cases, from the left ear in 13 cases and from the right ear in five cases.

The complications which may result from the leakage of blood or cerebrospinal fluid from the ear are otitis media, mastoiditis and meningitis.

The occurrence of mastoiditis following a fracture of the skull is relatively rare. Miller and Lauppe[8] state in a review of the literature that only 21 cases were reported since 1882. In these instances the treatment consisted of a mastoidectomy.

The treatment of cerebrospinal otorrhea may be best described as "hands-off therapy." The injured ear should be examined frequently, but irrigation, aural douching, drops and probing should be avoided. If an otitis media develops, then it should be treated as such and a myringotomy performed when indicated.

If meningitis presents itself as a complication, the treatment, as in all cases of otitic meningitis, must be heroic. The final result, however, is usually unsatisfactory.

CASE REPORT.

Case 1. A case of cerebrospinal otorrhea of nine years' duration, showing a history of a fractured skull with continuous drainage of fluid: The patient, R. T., male, age 14 years, was referred to the otology service of Temple University Hospital for study, through the courtesy of Dr. Enoch Blackwell, of Trenton, N. J. This patient was in good health until November, 1925, when he was struck by an automobile and sustained a fractured skull. He was in the hospital for two months. The patient believes that blood came from his ear at the time. While the patient was in the hospital, a watery discharge began to exude from the ear, which persisted since. The patient believes that there is some impairment of hearing, which he dates back to the time of the injury. The discharge became suppurative and was offensive in odor. At the present time there is binaural suppuration.

Examination revealed a boy of 14 years, well developed, both physically and mentally, and without defects other than the otitic picture. In the left ear, on viewing the drum with the magnifying otoscope and on Valsalvalizing, we noted that there was an esecape of a colorless glistening fluid from the region of the anterior superior quadrant, anterior to the promontory. In addition, there was also a chronic suppuration.

Neurological examination was essentially negative, except for the escape of cerebrospinal fluid from the left ear.

Vestibular examination, by Dr. J. Winston, showed a slight loss of function in the right vestibular apparatus and a marked loss of function in the left vestibular apparatus.

While the X-ray reports revealed a bilateral chronic mastoiditis, a careful study did not reveal any evidence of an old fracture in the region of the temporal bone.

Blood studies were perfectly normal.

The spinal fluid has drained at the rate of 5 to 10 cm. daily for the past nine years. Several specimens were collected and sugar was present to the extent of 15 mgm. per 100 cm.

Culture of spinal fluid collected from the external auditory canal revealed Bacillus Coli Communis, no doubt due to the chronic suppuration.

SUMMARY OF CASE AND COMMENT.

1. History of a fractured skull in 1925.

2. Drainage of cerebrospinal fluid from the left ear since that time.

3. Superimposed bilateral chronic suppurative otitis media.

4. Patient was apparently comfortable, attended school, did not complain except for the drainage and slight excoriation of the external auditory canal and the lobule.

The patient was carefully studied for one week and after due consideration because of the fear of meningitis, it was decided not to institute any operative procedure because the fistulous tract would probably be walled off and protected and might eventually close. If the patient had been operated upon, new avenues might have opened and infection spread resulting into meningitis. It so happens that patient is at the present time happy and attending school.

CASE REPORT.

Case 2: A football player, injured during game; bloody drainage from left ear followed by drainage of cerebrospinal fluid. The ear was dry in 12 days. The X-ray showed no evidence of a fractured skull. Patient, E. S., age 21 years, was admitted to the Temple University Hospital, otology service, on Nov. 20, 1932. There was a history of the patient having been kicked on the head during the course of a football game. The left ear was pushed into the mud. The patient stated that he was stunned for a few minutes, but was not

unconscious. He attempted to get up, but said that he did not know where his feet were. However, he played during the remainder of the game. He went to the club house after the game complaining of dizziness. At this time it was observed that blood and mud were present in the external auditory canal. For this reason his ear was syringed and it was noted that a discharge of blood-tinged fluid followed.

Physical examination was negative, except for the left ear. Otoscopic examination revealed the following: There was a slit-like perforation in the lower half of the left tympanic membrane with a discharge of serosanguineous fluid containing dirt. The hearing in the left ear was markedly decreased. The patient complained of some dizziness and vertigo.

Roentgenographic study by Dr. W. E. Chamberlain was as follows: Stereoscopic films of the skull were made in four directions. They failed to show any X-ray evidence of fracture of the skull. The air cells in the left mastoid appeared slightly more dense than the right and there was no evidence of bone destruction in any part of the mastoid.

Conclusions: The findings in the left mastoid may possibly have been due to the presence of blood in the mastoid cells, although there was no X-ray evidence of a fracture in any part of the skull. On Nov. 28, 1932, eight days after admission to the hospital, the skull was again X-rayed on account of the history of escape of cerobrospinal fluid from the left ear; again no evidence of fracture could be made out.

Blood count was entirely normal; urinalysis was normal. Specimens of fluid from the left ear on three successive days revealed the following:

Nov. 21, 1932: Sugar, 166 mgm. per 100 cm.

Nov. 22: Sugar, 98 mgm. per 100 cm.

Nov. 23: No sugar.

After Nov. 23, 1932, there was a slight mucopurulent discharge which ceased draining before the patient was discharged from the hospital. The treatment in this case consisted of rest in bed, without any treatment to the ear with the exception of the preliminary irrigation he received in the club house.

SUMMARY.

1. Injury to the left ear during a football game.

2. No evidence of a fractured skull.

3. Drainage of cerebrospinal fluid from the left ear.

COMMENT.

This is a case of cerebrospinal otorrhea resulting from trauma but without X-ray evidence of fractured skull. In itself this is unusual, as in most instances there is a concomitant basal fracture. The only evidence in these two cases to substantiate the presence of cerebrospinal fluid was the quantitative sugar estimation. One must evaluate this reaction when there is a great deal of blood present in the secretions since the blood in itself contains a certain amount of sugar. However, if following trauma, if one notes a colorless fluid coming from the ear, which when tested reveals the presence of sugar, it is reasonable to assume that this is cerebrospinal fluid. Unfortunately, we did not make a blood sugar estimation at the same time the spinal fluid was studied. The comparison of the two blood sugars might have thrown more light on the case.

It is to be noted here that our patient, R. T., only had 15 mgm. of sugar per 100 cm. of the fluid collected from the ear. There is no doubt that this low sugar content was due to the presence of microorganisms which, in this instance, was the Bacillus Coli Communis. It is important to remember that in all suspicious cases of cerebrospinal otorrhea or rhinorrhea, repeated sugar estimations should be made. If the amount of drainage is small, it takes many hours to collect and the fluid therefore is in contact with the other secretions from the nose or ear, which contain organisms, and which may reduce the sugar content to such a small degree as to cause one to make an erroneous diagnosis.

CONCLUSION AND SUMMARY.

1. A brief review of the literature on cerebrospinal otorrhea.

2. Presentation of a case (R. T.), where draining of spinal fluid from the left ear ensued for nine years. In perusing the literature we were unable to find a case reported with a history of drainage for such a length of time.

3. An acute case of cerebrospinal otorrhea without evidence of a fractured skull where there was a complete recovery in 12 days.

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1915 Spruce Street.

THE NEW YORK ACADEMY OF MEDICINE.

SECTION OF OTOLARYNGOLOGY.

Meeting of March 21, 1934.

(Continued from July issue.)

A Simple Surgical Method of Dealing With Salivary Calculi in the Submaxillary Ducts. Dr. August L. Beck.

(To be published in a subsequent issue of THE LARYNGOSCOPE.*)*

DISCUSSION.

DR. LEE M. HURD: Mr. Chairman, ladies and gentlemen: I do not see much to add to Dr. Beck's paper. This little wrinkle he has of putting two sutures in to open the mouth of the duct sounds pretty good to me and I will try it out right away.

Recently a young woman consulted me with symptoms of intermittent obstruction of Wharton's duct. X-ray films showed a very small calculus near the mouth of the duct. I put in the sutures as Dr. Beck suggested, and easily entered the duct with the canaliculus knife, but on opening the duct found no stone. A subsequent X-ray showed that I had pushed the calculus up the duct with the knife. A very small calculus like that is apparently a very hard thing to detect. I might bring out one thing. It depends on the size of the calculus. The bigger the calculus, the easier it is to get out.

The effect of the calculus in the duct may cause three different conditions. You can have a suppuration with the calculus in the center, looking like an abscess in the floor of the mouth. You can have a fistula in the floor of the mouth running down to it; or you can have a hard nodular mass, sometimes diagnosed as carcinoma. It has undoubtedly sometimes been operated on as carcinoma. X-ray pictures should be taken to show the calculus in the duct. I think the mouth film is a better way of detecting the calculus in the duct than the lateral plate. There is no bone or anything in the way.

DR. THEODORE BLUM: Mr. Chairman, ladies and gentlemen: First of all, I would like to add one point in regard to the diagnosis of salivary calculus. The films which Dr. Hurd showed are applicable of course mainly for stones in Wharton's duct. It is important of course to make all of these examinations. At the same time we must remember there are certain stones which will not show on the X-rays. I have removed stones where extra- and intraoral films were taken and the stone did not show on the films. It is also well to X-ray the patient after the operation because very often the surgeon is accused of not having removed the stone. Not having this record, of course, these accusations may be upheld.

Instead of putting these sutures in as Dr. Beck advised, you will find that if you press the tissues of the floor of the mouth up into the mouth and depress the jaws at the same time, you will not need this technique. The simplest way in the small stones and in the anterior part is to introduce the Bowman's probe, already in position, and then incise over the probe. All of the stones I have removed were simply removed in that fashion. Slitting the mouth of Wharton's duct has never been necessary in my experience. If you have any difficulty in finding the opening of the duct it will be very simple to apply tincture of iodine, which will make the mouth of the opening very easy to find.

DR. EMANUEL M. JOSEPHSON: In my experience with calculi of the type in question, I have seldom found it necessary to slit open the entire length of the duct. It has been found possible to immobilize the tissues by counter-pressure on the tissues of the lower jaw, or at the angle of the jaw, and to incise down directly on the site of the calculus and remove it. The passage of the lacrimal probe into the duct as an aid in orientation is helpful. But I agree with Dr. Blum that it is seldom, if ever, necessary to forcibly retract or slit the mouth of the duct to secure the passage of even the larger lacrimal probes; for they generally slip into the duct with ease.

An advantage of incising down on the calculus directly instead of slitting the duct to the point of lodgment of the calculus is that the latter procedure more frequently results in failure of closure of the duct and fistula formation, whereas the former generally gives healing without obstruction of the duct. Fistulae may be annoying to the patient when it results in a copious discharge of secretion well back in the mouth, which in the sensitive patient gives rise to reflex nausea and gagging at times.

A previous speaker has suggested the difficulty of probing after a calculus so small that it is readily pushed backward into the duct as the probe advances. Such calculi can often be milked out of the duct by massage with the fingers, rendering probing and operation totally unnecessary.

DR. AUGUST L. BECK: I was very glad to hear Dr. Hurd give his experience with that small stone because the same thing has happened to me when chips of the larger ones have broken loose. It did not occur to me to make a point of it because with gentle suction I have always succeeded in getting it out.

So far as the fistula formation goes, what if you do get a fistulous opening in the floor of the mouth? The normal opening is a fistula. It is not the same problem as with the lacrimal canaliculus. This orifice is put there for fluid to come out of. What difference does it make where this opening is, at the end of the duct or in the middle of it? As a matter of fact, they have healed very nicely. The papilla is a little less prominent afterwards.

I hope I have answered everything. I feel constrained to say one thing. I once heard Dr. Clyde Lynch talk about his frontal sinus operation. In concluding, he said: "When everything else fails, try this. It is simple, you get out in less time, and after seeing it done once my internes go ahead and do it."

MINNESOTA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

SECTION ON OTOLARYNGOLOGY.

Meeting of March 23, 1934.

DR. H. L. WILLIAMS presented two cases which he said were reported to emphasize three points:

1. The present interest in spreading osteomyelitis might cause one to lose sight of the fact that most osteomyelitis of the frontal bone is self-limited, and thus lead to too early radical surgery.

2. Surgery of the frontal sinus, even in extensive disease, can usually be done with a good cosmetic result, incisions in the skin of the forehead rarely being necessary.

3. The cure of suppuration in the frontal sinus depends upon securing good intranasal drainage.

Case 1. R. E., age 18 years, No. 618269. The patient had an acute frontal sinusitis a year ago on the left side with swelling near the inner canthus opened by home physician and has had a fistula near the inner canthus since. Dead bone could be felt through the fistula and a probe easily entered the frontal sinus. There was very marked septal deflection to the left, especially superiorly. Ear, nose and throat, and general examination was otherwise negative.

X-ray shows a marked haziness of the left frontal sinus. The markings are very indistinct, suggesting that there may be some associated osteitis and osteomyelitis. There are several hazy, somewhat dense shadows which may possibly represent destruction, but the appearance is not entirely characteristic. There is also some haziness in the region of the left antrum and middle ethmoid cells, but this is much less marked than in the frontal sinus.

Conclusion: Left ethmoidal and frontal sinusitis; osteomyelitis of the left frontal sinus.

Because of the apparent integrity of the external plate, a Lynch type (Jansen) operation was advised. At operation a sequestrum was found in the orbital aspect of the sinus with a fistula into the sinus. There was a septum dividing the frontal sinus into anterior and posterior halves, which was also sequestrated. The sinus was filled with pus and infected granulations, which were removed. The anterior ethmoid cells were removed and an opening made into the nose, easily admitting a 1 cm. ring curette. The wound was closed with dermal.

Convalescence was uneventful, but the writer was undecided whether or not to remove the septal deflection. This was not done. The patient had a severe cold three weeks after operation and the sinus filled up and broke through the orbital wound. The septum was then operated, but there was great difficulty in getting the fistula to close in spite of the large intranasal opening. However, it closed a few days before this meeting.

Case 2. Mrs. L. A., No. 621453. Four years ago the patient had a sudden severe left frontal headache, with pain and tenderness, during a cold. She was hospitalized and hot packs applied. A month later an external operation

was done on the left frontal. She had a persistent fistula in the left brow and a second operation was done a year later, with the same result. About a week before admission to this hospital she began to have severe headaches.

At examination a fistula was found in the left brow and bare bone could be felt through the fistula. No intranasal opening was found. The ear, nose and throat, and general physical examination was otherwise negative.

X-ray film shows some cloudiness of the right antrum, suggesting a chronic infection. There is marked cloudiness in the frontal sinuses, and this seems somewhat more marked on the left. There is some increased density and loss of the margins, suggesting osteomyelitis of the adjacent frontal bones.

Conclusion: Right maxillary and bilateral frontal sinusitis. Osteomyelitis of the frontal bone.

Examination of the X-ray from the clinical standpoint suggested that at the previous operation the orbital ethmoids had been entered, but that the left frontal proper was not diseased.

A puncture of the right antrum was negative. The right nasofrontal duct could be probed with a fine probe and no pus followed its withdrawal. There was no tenderness in the right frontal region.

Because of the diseased condition of the external plate, a left-sided external operation of the Killian type was advised.

At operation a small opening into the orbital ethmoid cells was found—the result of the two previous operations. A fistula through the bone was found just above the brow, but there was no opening between the frontal and anterior ethmoids. The frontal was opened and the bone forming the anterior wall removed to the limits of the sinus and the edges beveled to eliminate pockets. A ridge was left to support the brow and an opening made beneath it for drainage. The bone of the orbital ethmoids was completely removed, a sequestrum being found beneath the fistula. Convalescence was uneventful.

Comment: The failure to do a submucous resection in the first case caused a recurrence of symptoms which were remedied only when a submucous was finally done, establishing free drainage into the nose.

The failure of the two previous operations on the second case was due to the fact that they had established no intranasal drainage, to the fact that no communication had been opened between the frontal and orbital ethmoid cells, and that the operation had not extended far enough to remove the sequestrum.

Dr. Lawrence R. Boies reported two cases, and the patients were presented.

Case 1. Tumor involving the right tonsil. Diagnosis ?.

This 22-year-old boy first noticed a small swelling in his neck just below the right ear about three months ago. It was discovered accidentally. He had experienced no discomfort of any sort. About a week later a physician was consulted and in the examination the patient learned that he also had a swelling involving the right tonsil. So far as can be determined from this boy's history, he has not experienced any fever, sore throat, malaise, etc.

The first physician decided that this was a peritonsillar abscess and incised the swelling. Apparently this was a perfectly reasonable thing to do. However, no pus was found and no improvement followed. During the next six weeks two more physicians were consulted and the swelling was incised three times at intervals. Apparently the results were the same as on the first occasion.

The patient was referred to us about ten days ago. At the time of his admission here it was noted that a rather firm diffuse swelling involved the whole of the right tonsillar area and the soft palate above. A healed scar

was noted in the anterior pillar. There was no surface ulceration and the color of the tonsil was a darker red than the large tonsil present on the left side. The swelling encroached on the right lateral pharyngeal space so that an examination of this area was unsatisfactory. There were no discrete glands on the external surface of the neck. There was a fullness evident below the angle of the jaw on the right and this fullness proved to be a swelling which was not hard or firm and apparently was part of the swollen tonsillar area. You will recall that the outer aspect of the tonsil is loosely attached to the superior constrictor muscle of the pharynx.

A complete general physical examination, blood studies and X-ray examination of the involved area were all negative. He had no fever and felt well except that he was now conscious of the swelling involving the tonsil on the right and stated that he thought it had gradually increased in size and interfered to some extent with his comfort in eating. Significant ear symptoms were absent and his hearing was normal.

After completing the examination, Dr. Boies said his feeling was that they were dealing with either a highly malignant tumor of the lymphoepithelioma type or possibly with a mixed tumor of the adenocarcinoma type, and he also felt that it would be wise to institute deep X-ray therapy at once. This was done. Several days after the treatment was in progress, the swelling was biopsied, using a sharp punch such as the dermatologists use, and about a centimeter of tissue was cored out through the anterior pillar. The pathologist reported: "Inflammatory tissue."

Those who wish to examine this patient will note that the swelling is about as described, although there has been a slight increase in the amount and there is more injection due to the fact that he has just completed his Roentgen therapy.

It is possible that we are dealing with a granuloma of an infectious origin. The results of the Roentgen therapy will be observed before any further treatment will be planned.

DISCUSSION.

DR. VIRGIL SCHWARTZ stated it was his understanding that the principal problem in this case is one of diagnosis. If the swelling on the outside is continuous with that in the pharynx, the mass is probably a cyst of bronchial origin. If so, it is doubtless of the type which passes in the Y-shaped aperture between the internal and external carotid arteries. The cyst might be starting to show benign or malignant degeneration.

Case 2. Carcinoma of the Larynx—Laryngectomy.

This gentleman claims that he is 71 years of age. It is difficult for one to believe that he has not mixed his birthdays, as one can readily see that he could pass for many years less than his stated age.

About six months ago, because of hoarseness, he consulted a physician. This symptom had apparently been present at least six months. His physician examined the larynx, biopsied the growth seen and received a report from the pathologist of "papilloma." Diathermy was used to cauterize the site from which the tissue was removed. This doctor apparently realized that the diagnosis of papilloma in a man of this age should be regarded with a great deal of suspicion. He sought to keep the patient under close observation for further study. In this the patient did not cooperate. About five months later he returned because he was having considerable obstruction to breathing. A tracheotomy was necessary and biopsy done at this time was reported to be a squamous cell carcinoma. He was then referred here for treatment.

Four weeks ago a one-stage laryngectomy was performed. The convalescence was uneventful except for the fact that it was difficult to keep the patient in bed after the third postoperative day.

Today he is still wearing the trachea cannula because a moderate amount of secretion is still being raised and the margins of the trachea opening, though healed over, are still easily irritated. An artificial larynx will soon be provided.

The larynx which was removed is being passed around. You will note that the growth involved both vocal cords and had grown a considerable extent into the subglottic space. In fact, it seems probable that the growth began in the subglottic area and extended upward to involve the cords. A section made at the time of the operation was reported to be squamous cell, grade III.

Cure is anticipated in this case as the tumor seems to be entirely localized within the larynx removed, which is well outside of the margins of the growth.

DR. H. P. ROSENBERGER (by invitation) reported a case of Frontal Sinusitis with Osteomyelitis with Brain Symptoms.

DISCUSSION.

DR. W. J. KUCERA said he had seen this patient at St. Barnabas' Hospital and was the first one to operate on him. He lived out of the city, but was staying here for a while with a sister. He was taken to St. Barnabas' Hospital and Dr. Kucera was called and told to bring his instruments along to operate at once. He had all the symptoms which Dr. Rosenberger mentioned, and Dr. Kucera said he decided the patient was in no condition to operate at the time he saw him. He studied the case for three days and then had a neurological consultation. The neurologist was strongly of the opinion that the patient had a left frontal lobe abscess. The patient seemed to be getting worse, and it was then thought best to do a frontal sinus and frontal lobe exploration. At operation it was found that the mucous membrane in the frontal sinus was collapsed. Upon examination the inner plate did not appear to show necrosis of the bone. The neurologist was present at the operation and stated he felt sure that it was an abscess. Dr. Kucera said he went through the inner plate and exposed the dura. He then passed a needle in for 2 cm. and found no evidence of abscess, but only a sense of resistance within the frontal lobe. Upon passing a trochar, no pus was obtained. Two more punctures were made. The frontal septum to the right side was necrosed and that was cut down, and the right frontal sinus was curetted through the intersinal opening. One interesting feature about this was the fact that this man lost 45 pounds in about five weeks.

He made an uneventful recovery after the operation. Last fall the patient went pheasant hunting and admitted to Dr. Kucera later that he drank some moonshine and later had a convulsion. After that, Dr. Kucera had passed the patient on to the University Hospital.

DR. HUBERT LEE (by invitation) reported a case of Hypernephroma with Metastasis to the Frontal Sinus.

DISCUSSION.

DR. C. E. CONNOR stated that this patient had been sent to him for a nasal examination, which revealed a right sided bloody discharge from the middle meatus with what appeared to be a dilated ethmoid capsule. The supraorbital swelling pulsated.

Operation revealed the condition indicated in the X-ray. In reflecting the orbital periosteum from the paper plate the posterior ethmoidal artery was ruptured, with a consequent hemorrhage severe enough to preclude any further work on the ethmoid.

The anterior and posterior tables were both destroyed by the process and the anterior pole of the frontal lobe was exposed over a circular area of at least 6 or 7 cm. in diameter. The dura appeared normal.

The tissue from the frontal sinus was not characteristic of chronic suppuration; it was friable and gelatinous. Malignancy, however, was not suspected and they were much surprised at the pathologist's report.

BOOK REVIEW.

Foreign Body in Air and Food Passages Roentgenologically Considered. By Chevalier Jackson, M.D., SC.D., LL.D., F.A.C.S., Professor of Bronchoscopy and Esophagoscopy, Temple University, and Chevalier L. Jackson, M.D., M.Sc. (Med.), F.A.C.S., Professor of Clinical Bronchoscopy, Temple University, Philadelphia. With 236 Roentgen-Ray Studies and ten clinical illustrations. New York: Paul B. Hoeber, Inc., 1934. Price $12.00.

In this book, the Jackson Clinic has produced a much needed treatise on the Roentgenological aspects of bronchoscopy and esophagoscopy. They make no claim to originality, having taken from many sources what they believe will add safety to many difficult procedures. This monograph represents a very formidable task and they have done it well. This work in their hands has practically proved to be axiomatic. The book is especially recommended to the physician who does occasional bronchoscopies and to the X-ray specialist. The frequency in which errors of diagnoses are made in this work makes it very necessary that the report of the X-ray consultant be accepted without question. Many foreign bodies do not show in the X-ray, but can be diagnosed by presumptive signs; question also arises as to whether the air passage or food passage is involved.

The double plane fluoroscope for foreign bodies in the air and food passages has become a definite procedure in the hands of Drs. Chevalier and Chevalier L. Jackson, and Dr. Chamberlain has so much improved the original apparatus of Dr. Manges that the work appears to be nothing short of miraculous. The method by which the timing of exposure is controlled is indeed remarkable. At a second's glance one can see what the exposure has been in both the vertical and horizontal rays. Inasmuch as this work is authoritative, no bronchoscopist or X-ray specialist can afford to be without it.

E. L. M.

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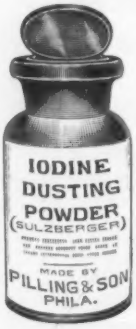

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